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NATIONAL DAM SAFETY PROGRAM. ISCHUA CREEK WATERSHED DAM NUMBER --ETC(U)

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| 20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization. Examination of available documents and visual inspection of the Ischua Creek Watershed Dam No. 5 and appurtenant structures did not reveal conditions which constitute a hazard to human life or property. However, the dam has some deficiencies which require further investigation and remedial action. | | |

Ponded water was observed on the emergency spillway and the berm on the downstream face of the dam. In addition, sloughing on the upstream slope to the left of the intake structure was observed. It is recommended that these conditions be evaluated further by a qualified registered professional engineer.

Using the Corps of Engineers screening criteria for review of spillway adequacy, it has been determined that the dam would not be overtopped under full PMF conditions. The PMF routed through the reservoir required 58 percent of the spillway outflow capacity. The spillway capacity is, therefore, judged to be adequate.

The investigations recommended should be completed within 12 months of notification to owner, and remedial actions resulting from these investigations completed in the subsequent 12 months.

The following remedial measures should be performed within 1 year of notification to owner:

- Install ladder rungs on the riser to provide access to the drain gate housing.
- Regrade and fill in the erosion gullies on the upstream slope.
- Remove vegetation on the slopes and crest of the embankment and the immediate downstream channel. Provide a program of periodic cutting and mowing of these surfaces.
- Clear debris from the trash racks and upstream slopes periodically.
- Implement a program of periodic inspection and maintenance of the dam and appurtenances including yearly operation and lubrication of the gate system. Document this information for future reference.
- Develop a formal written downstream warning system to alert the appropriate officials and residents in the event of an emergency.

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**ISCHUA CREEK WATERSHED
DAM No. 5**

**CATTARAUGUS COUNTY, NEW YORK
INVENTORY No. N.Y. 565**

**PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM**



NEW YORK DISTRICT, CORPS OF ENGINEERS

AUGUST 1981

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PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the Investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I Inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event a finding that a spillway will not pass the Test Flood should not be interpreted as necessarily posing a highly inadequate condition. The Test Flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

| | |
|---------------------|-------------------------------------|
| Name of Dam: | Ischua Creek Watershed Dam No. 5 |
| State Located: | New York |
| County Located: | Cattaraugus |
| Basin: | Allegheny River |
| Date of Inspection: | April 2, 1981 |

ASSESSMENT

Examination of available documents and visual inspection of the Ischua Creek Watershed Dam No. 5 and appurtenant structures did not reveal conditions which constitute a hazard to human life or property. However, the dam has some deficiencies which require further investigation and remedial action.

Ponded water was observed on the emergency spillway and the berm on the downstream face of the dam. In addition, sloughing on the upstream slope to the left of the intake structure was observed. It is recommended that these conditions be evaluated further by a qualified registered professional engineer.

Using the Corps of Engineers screening criteria for review of spillway adequacy, it has been determined that the dam would not be overtopped under full PMF conditions. The PMF routed through the reservoir required 58 percent of the spillway outflow capacity. The spillway capacity is, therefore, judged to be adequate.

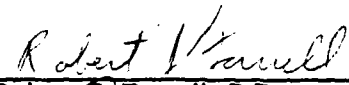
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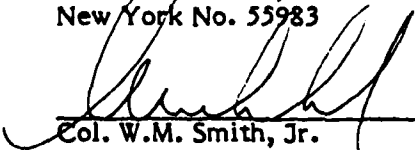
The following remedial measures should be performed within 1 year of notification to owner:

- Install ladder rungs on the riser to provide access to the drain gate housing.
- Regrade and fill in the erosion gullies on the upstream slope.
- Remove vegetation on the slopes and crest of the embankment and the immediate downstream channel. Provide a program of periodic cutting and mowing of these surfaces.
- Clear debris from the trash racks and upstream slopes periodically.
- Implement a program of periodic inspection and maintenance of the dam and appurtenances including yearly operation and lubrication of the gate system. Document this information for future reference.
- Develop a formal written downstream warning system to alert the appropriate officials and residents in the event of an emergency.

Approved by:

Date:


Robert J. Farrell, P.E.
New York No. 55983

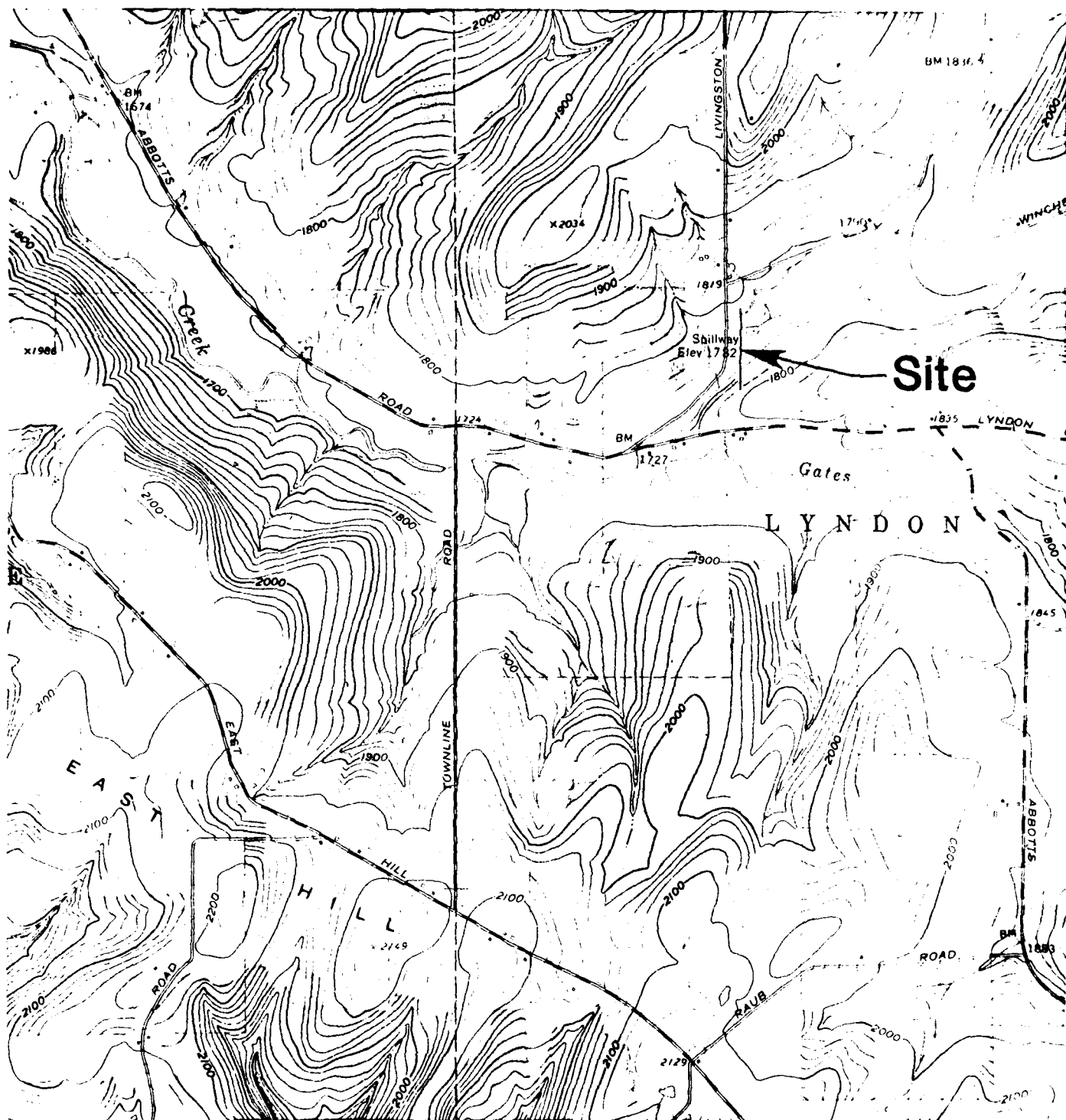

Col. W.M. Smith, Jr.
New York District Engineer

18 Aug 81

**Ischua Creek Watershed
Dam No. 5**



AERIAL VIEW



Ischua Creek Watershed Dam No. 5

LOCATION PLAN

Scale: 1"=2000'

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

ISCHUA CREEK WATERSHED DAM NO. 5

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority

The Phase I Inspection reported herein was authorized by the New York District Corps of Engineers in a letter dated 24 February 1981, in fulfillment of the requirements of the National Dam Inspection Act, Public Law 92-367, dated 8 August 1972.

b. Purpose of Inspection

This inspection was conducted to evaluate the existing conditions of the dam, to identify deficiencies and hazardous conditions, to determine if these deficiencies constitute hazards to life and property, and to recommend remedial measures where required.

1.2 DESCRIPTION OF THE PROJECT

a. Location

The dam is located on a tributary of Gates Creek in the Town of Lyndon, 3.5 miles southeast of Franklinville, New York. It can be reached from Livingston Rd. which intersects Abbotts Rd. out of Franklinville. The dam is shown on U.S.G.S. Franklinville, New York quadrangle with coordinates at N42° 18' 47", W 78° 23' 43" (see location plan). Page B4 of Appendix B is a site plan for this dam.

b. Description of Dam and Appurtenances

The dam consists of a homogeneous earthfill embankment with an earthfill cutoff trench below; a principal spillway with a reinforced concrete riser structure and outlet pipe; and a vegetated earth channel emergency spillway located to the south of the dam embankment. The length of the dam embankment is approximately 1300 ft. The emergency spillway is 350 ft. wide.

1) Dam Embankment

The embankment is constructed of semi-pervious silty sand and gravel. It is approximately 1300 ft. long and a maximum of 54 ft. high.

The upstream slope is 3 horizontal to 1 vertical and the downstream slope is 2.5 horizontal to 1 vertical. The crest width is 18 ft.

There are berms on the upstream and downstream slopes approximately 10 ft. wide. The berm on the upstream slope extends the full length of the dam at elevation 1752.0 ft. (MSL). The berm on the downstream slope varies in elevation over the length of the dam. However, it is approximately at elevation 1770 ft. (MSL).

Beneath the embankment is an earthfill cutoff trench which is 14 ft. wide at the bottom. According to available plans, it is constructed of the same material as the embankment.

The dam is founded on silty sand and gravel (designated GM using the Unified Soil Classification System).

2) Emergency Spillway

The emergency spillway is cut into silty sand and gravel in the south abutment. Diversion berms of compacted fill have been constructed on both sides with side slopes of 3 horizontal to 1 vertical. The grass covered channel curves around the south end of the dam embankment.

The control section is 350 ft. wide and 30 ft. long and the downstream channel is roughly 700 ft. long.

3) Principal Spillway

The principal spillway consists of a reinforced concrete drop inlet structure with a 48 in. diameter reinforced concrete water pipe supported on a concrete cradle, and a stone lined plunge pool.

The inside dimensions of the riser structure are 34.5 ft. high and 12.0 ft. wide normal to the axis of the dam. It is 4.0 ft. long parallel to the embankment and flares to 17.0 ft. at the top. The walls of the structure are 20 in. thick for the bottom 12 ft., 16 in. thick for the next 12 ft., and 12 in. thick for the top section. The structure is founded on a 9.3 ft. by 18.3 ft. spread footing. The "low stage inlet" is an uncontrolled opening 2.0 ft. long and 1.5 ft. high with a crest elevation at 1752.0. It is protected by a trash rack fabricated from galvanized steel angle sections and reinforcing bar.

The "high stage inlet" consists of two openings 33.0 ft. above the invert of the riser. They are 12.0 ft. wide and 1.5 ft. high and are located in the left and right sides of the flared portion of the riser structure. They are protected by four galvanized steel pipes placed in the sloping section below each opening. A 2.0 ft. by 2.0 ft. manhole permits access into the riser structure.

The riser structure is drained by a 48 inch diameter reinforced concrete pressure pipe. It is approximately 316 ft. long and drops approximately 3 ft. over that length. The pipe penetrates the downstream side of the riser structure and is supported by a 12 in. thick reinforced concrete cradle within the embankment. Plans indicate 7 anti-seep collars cast around the pipe within the embankment.

The plunge pool is 28 ft. long parallel to the axis of the outlet pipe and has a base 8 ft. wide with slopes of 2.5 horizontal to 1 vertical rising on both sides. The pool is lined with rip rap 1.5 ft. thick.

4) Reservoir Drain

The reservoir drain consists of a 12 in. diameter bituminous coated corrugated metal (BCCMP) pipe extending 48 ft. upstream from the riser. At the riser is a 12 in. diameter vertical lift gate; it is controlled by a stem extending to the top of the riser and can be operated by a wheel. At the upstream end of the pipe is a 24 in. diameter vertical BCCMP 8 ft. long perforated for the top 6 ft. which acts as the drop inlet.

5) Foundation and Embankment Drainage

A 2 ft. thick blanket drain is located below the downstream slope ; it extends from 40 ft. downstream of the centerline of the dam to the downstream toe of the dam. This drain outlets into a cobble drain which extends along the downstream toe and drains into the outlet channel.

c. Size Classification

The dam's height of 54 ft. places it in the INTERMEDIATE size category according to the Corps of Engineers Recommended Guidelines.

d. Hazard Classification

The hazard potential classification for this dam is HIGH because of the significant economic losses and high potential for loss of life downstream in the event of dam failure. Section 5 of this report presents more detailed discussion of the hazard potential.

e. Ownership

The dam is owned and operated by:

Cattaraugus County
James M. Cash, Chairman of Oversight Committee
RD #2
Maple Grove Road
Franklinville, New York 14737
Tele: (716) 767-3604

f. Purpose of Dam

The purpose of this dam is to reduce downstream flooding by providing temporary storage for the runoff from 4,096 acres. The temporary storage is released gradually through the two-stage principal spillway system.

g. Design and Construction History

The dam was built under the Watershed Protection and Flood Prevention Act by the Ischua Creek County Small Watershed Protection District with the assistance of the Soil Conservation Service. It was completed in 1961.

h. Normal Operating Procedures

The dam is normally self-regulating.

1.3 Pertinent Data

a. Drainage Area

The drainage area for this dam covers 6.4 square miles. It is made up primarily of rolling pasture and woodland and minor development.

b. Discharge at Dam Site

1) Outlet Works

Normal discharge at the site is through the 48 in. diameter outlet pipe. In the event of severe flooding, water would flow over the emergency spillway at elevation 1782.0 ft. (MSL). The invert of the low stage orifice is at elevation 1752.0 ft. (MSL). The invert of the high stage orifice is at elevation 1772.0 ft. (MSL)

2) Maximum Known Flood

There is no data available for the maximum known flood at dam site. Recent high water was observed at elevation 1769.7 ft. (MSL).

3) Ungated Spillway Capacity at Top of Dam

The capacity of the principal spillway with the reservoir at top of dam elevation (1789.2 ft MSL) is 431 cfs. The capacity of the emergency spillway is 21,706 cfs at this level.

4) Ungated Spillway Capacity at Test Flood

The capacity of the principal spillway with the reservoir at test flood elevation (1786.9 ft. MSL) is 401 cfs. The capacity of the emergency spillway is 12,114 cfs at this level.

5) Gated Spillway Capacity at Normal Pool

There are no gated spillways.

6) Gated Spillway Capacity at Test Flood

As previously mentioned, there are no gated spillways.

7) Total Spillway Capacity at Test Flood

The total spillway capacity at test flood elevation (1786.9 ft. MSL) is 12,515 cfs.

c. Elevation (ft. above NGVD)

- 1) Streambed at toe of dam: 1735.3
- 2) Bottom of cutoff: variable, approximately 1735 minimum
- 3) Maximum tailwater - unknown, outlet conduit invert 1736.0
- 4) Normal pool: 1752.0
- 5) Full flood control pool: 1782.0
- 6) Spillway crest - Low level orifice: 1752.0
High level orifice: 1772.0
Emergency spillways: 1782.0
- 7) Design surcharge (original Design): 1787.2
- 8) Top of Dam: 1789.2
- 9) Test flood surcharge: 1786.9

d. Reservoir (Length in feet)

- 1) Length of maximum pool: 4,000[±] ft.
- 2) Length of normal pool: 1700[±] ft.
- 3) Length of flood control pool: 3700[±] ft.

e. Storage (acre-feet)

- 1) Normal pool: 45.0
- 2) Flood control pool: 1029.0
- 3) Spillway crest pool:
 - a) Low stage inlet: 45.0
 - b) High stage inlet: 471.0
 - c) Emergency spillway: 1029.0
- 4) Top of dam: 1643
- 5) Test flood pool: 1389

f. Reservoir Surface (acres)

- 1) Normal pool: 8.5
- 2) Flood control pool: 74.0
- 3) Spillway crest pool
 - a) Low stage inlet: 8.5
 - b) High stage inlet: 42.0
 - c) Emergency spillway: 74.0
- 4) Test flood: 91.5
- 5) Top of dam: 98.5

g. Dam

- 1) Type: Earth Embankment
- 2) Length: 1300 ft.
- 3) Height: 54 ft.
- 4) Top Width: 18 ft.
- 5) Side Slopes:

| | |
|-------------|---------|
| Upstream: | 3H:1V |
| Downstream: | 2.5H:1V |
- 6) Zoning: Homogeneous semi-pervious silty sand and gravel, blanket type seepage drain under 70% of downstream embankment.
- 7) Impervious Core: None
- 8) Cutoff: 14 ft. width, earthfill
- 9) Grout Curtain: None

h. Diversion and Regulating Tunnel

Not applicable

i. Spillways

- 1) Type:
 - a) Principal Spillway: Reinforced concrete drop inlet
 - b) Emergency Spillway: Grass covered earth channel cut in south abutment
- 2) Length of Weir:
 - a) Low Level Orifice: 24 in.
 - b) High Level Orifice: 24 ft.
 - c) Emergency Spillway: 350 ft.
- 3) Crest Elevation: (feet above NGVD)
 - a) Low Level Orifice: 1752.0
 - b) High Level Orifice: 1772.0
 - c) Emergency Spillway: 1782.0

- 4) Gates: None
- 5) Upstream Channel: Tributary of Gates Creek, narrow stream to reservoir through farm and woodland
- 6) Downstream Channel: Tributary of Gates Creek, narrow stream through farm and woodland

j. Regulating Outlet:

There is a reservoir drain consisting of 8 ft-24 in. diameter drop inlet with the top 6 ft. perforated. The inlet drains through a 12 in. diameter pipe equipped with a 12 in. lift gate and rising stem at the riser structure. The invert of the inlet is 1740.0 (NGVD)

SECTION 2 - ENGINEERING DATA

2.1 GEOLOGY

Bedrock at the dam site is upper Devonian Age (345-375 million years ago) interbedded shales, siltstones, and sandstones. These relatively underformed sedimentary rocks are medium hard. Regionally, the rock forms a homocline which dips southward to southwestward at approximately 40 feet per mile. Small terraces and low folds modify this dip to essentially flat-lying over short distances. Only minor folding and faulting are found in the region with no major or active faults known to exist in the area.

The Ischua Creek Watershed Dam No. 5 is located in a region classified as Zone 2 seismicity, as shown on Figure No. 1 of the Recommended Guidelines for Safety Inspections of Dams.

Pleistocene glaciation (beginning approximately 2 million years ago) has modified the topography by means of erosion and deposition. The thick continental ice sheet advanced and receded many times in south western New York smoothing terrain by glacial scour and mantling the uplands with till deposits.

The pleistocene geology of the dam site consists of glacial ground moraine deposits. Dense clayey glacial tills with moderate amounts of siltstone and sandstone channers comprising the coarse fraction of the till, and overlying alluvial glacial deposits comprise the overburden of the dam site. In recent times, alluvium from upland erosion, has been deposited on the glacial material.

2.2 SUBSURFACE INVESTIGATION

Test hole logs are contained in the "As-Built" drawings. A number of test pits and drill holes were dug to determine subsurface conditions.

2.3 DESIGN RECORDS

The records available for the project consists of 10 contract drawings which show the plans, sections and details of the dam, appurtenant structures, impact basin details and grating, fencing details, and logs of test holes; and a design report issued by the U.S. Soil Conservation Service dated April 4, 1961.

2.4 CONSTRUCTION RECORDS

Construction records and specifications are available at the U.S. Soil Conservation Service, Design Section, Syracuse, New York.

2.5 OPERATION RECORDS

No written maintenance or operation records exist for the dam.

2.6 EVALUATION OF DATA

Information obtained from the "As-Built" drawings is consistent with observations made during this inspection. The information obtained from available data was considered adequate for the Phase I inspection and evaluation.

SECTION 3 - VISUAL INSPECTION

3.1 Findings

a. General

The Ischua Creek Watershed Dam No. 5 is in good condition at the present time.

b. Dam

1) Earth Embankment (See Photos 2, 4 and 5)

The brush growth is light on this embankment and no animal burrows were noted during the inspection of this dam. The entire dam shows a relatively high moisture content. However, this is believed to be the result of the recent spring thaw. The high moisture condition is not considered a problem with the exception of two areas noted below.

A berm approximately 10 ft. wide located on the downstream slope has been constructed in such a way that it collects surface runoff. As a result there is ponded water all along the top of this berm. Provision should be made to provide a drainage path for this ponded water.

Erosion gullies up to 6 inches deep were noted in the left upstream abutment contact. These are the result of high concentrations of surface runoff from the adjacent emergency spillway section. Some form of drainage path should be provided to prevent erosion in this area.

The crest of the dam is in good condition with no evidence of vertical or horizontal movement.

There is no slope protection on the upstream slope other than the vegetative cover and a 10 ft. berm at the waterline. Approximately 1 to 2 inches of erosion due to wave action was noted at the water line on the upstream slope.

The blanket type toe drain under the downstream slope appears to be functioning properly as no seepage was noted at the dam. The cobble drain is moist over its entire length, but it is not clear whether this water is emanating from the drain or surface runoff.

A small area to the left of the intake structure on the upstream slope has been subjected to sloughing on the order of 2 to 3 ft. in diameter.

2) Emergency Spillway (See Photos 3 and 6)

The emergency spillway is generally in good condition with the exception of a large area of ponded runoff or natural groundwater. This area appears to be entirely upstream of the control section of the channel and encompasses the entire upstream end of the emergency spillway. Drainage of this impounded water has caused erosion gullies along the upstream end of the channel leading into the reservoir as well as the gullies discussed in the previous section.

c. Principal Spillway

The water surface was at the top of the orifice opening in the riser (elevation 1753.5 ft. MSL) and protected with an effective trash rack. The riser was in excellent condition with no evidence of spalling, cracking, or efflorescence. The gate which could be used to drain the reservoir was covered with water at the time of observation so the mechanism was not visible.

d. Reservoir Area (See Photo 1)

The shore of the reservoir is generally shallow sloping pasture or woodland. It appears to be stable and in good condition.

e. Downstream Channel

The downstream channel is a narrow channel passing over relatively a flat flood plain. There is rip rap protection of the plunge pool, but erosion of the banks has taken place above the level of the rip rap 300 ft. downstream of the outlet.

3.2 Evaluation

The dam is generally in good condition. The potential problems noted during the visual inspection are listed below:

- a. Drainage gullies on the main dam and upstream of the emergency spillway,
- b. Ponded water in the emergency spillway channel and the berm on the downstream slope,
- c. Erosion of the downstream channel banks above the level of the rip rap;
- d. Sloughing of the upstream slope to the left of the intake structure;
- e. Operation of the drain gate could not be checked due to its location below the water surface,
- f. The inaccessibility of the drain gate.

SECTION 4 - OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURES

No written operation and maintenance procedures exist for the project. The normal operation of the project consists of allowing water to flow through the service spillway outlet pipe.

4.2 MAINTENANCE OF DAM

Maintenance of the dam is performed when the need arises. Maintenance is not considered adequate.

4.3 WARNING SYSTEM IN EFFECT

No warning system is in effect or in preparation.

4.4 EVALUATION

The overall condition of the dam and appurtenant structures appears to be good. Recommendations in connection with regular maintenance are discussed in Section 7.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 Drainage Area Characteristics

The Ischua Creek Dam No. 5 is located on a tributary of Gates Creek, a tributary of Ischua Creek, in the Allegheny River basin, and has a drainage area of 6.4 square miles. The dam is situated approximately 3.5 miles southeast of Franklinville, New York with its confluence with Ischua Creek about 1 mile south of Franklinville. Dam NY00571 is located on Gates Creek approximately 2.8 miles downstream of the dam. The topography of the watershed varies between steep and gentle sloping hills.

5.2 Design Data

This dam was designed as a class (c) structure in accordance with criteria as established in Washington Engineering Memorandum SCS-27. Under this classification the emergency spillway is designed for a rainfall equal to $P(100) + 0.26[PMP - P(100)]$, while the freeboard pool is designed for the PMP rainfall.

The Soil Conservation Service (SCS) design calculations have been reviewed. The dam was designed to pass the 100-year flood with antecedent moisture condition III, without discharging through the emergency spillway. The peak inflow is 3577 cfs, peak outflow is 305 cfs and peak elevation is 1782.0 ft. (MSL). The SCS design allowed for a 50-year sediment accumulation with a surface area of 8.5 acres, elevation of 1752.0 ft. (MSL) and a storage of 45.0 acre-ft. The principal spillway consists of a 48" diameter reinforced concrete water pipe and a 4' x 12' reinforced concrete riser. The riser has a low orifice elevation of 1752.0 ft. (MSL) and a crest elevation of 1772.0 ft. (MSL). The emergency spillway control cross section is 350 ft. wide with side slopes of 3 horizontal to 1 vertical and a crest elevation of 1782.0 ft. (MSL). The dam crest elevation is 1789.2 ft. (MSL).

5.3 Analysis Criteria

The analysis of the spillway capacity of the dam and the storage of the reservoir was performed using the Corps of Engineers HEC-1 Dam Safety Version computer model. The unit hydrograph was defined by the Snyder Synthetic Unit Hydrograph method, and the Modified Puls routing procedure was incorporated. The Probable Maximum Precipitation (PMP) was 22.5 in. (24 hrs., 200 sq. miles) from Hydrometeorological Report #33 in accordance with recommended guidelines of the Corps of Engineers. The dam is 54 ft. high and impounds approximately 1643 acre-ft. at the top of the dam. The dam is classified as a HIGH hazard and INTERMEDIATE in size, according to the Recommended Guidelines of the Corps of Engineers. The spillway design flood is the PMF. The floods selected for analysis were 20, 40, 50, 60, 80 and 100% of the Probable Maximum Flood (PMF) flows. The PMF inflow of 12,597 cfs was routed through the reservoir and the peak outflow was determined to be 12,515 cfs. The peak PMF outflow would produce an eroding velocity of 11.2 ft./sec. on the emergency spillway.

5.4 Reservoir Capacity

The reservoir capacities at the crest of the emergency spillway, and at the top of the dam are 1029 acre-ft. and 1643 acre-ft., respectively. Surcharge storage between the emergency spillway crest and the top of the dam is equivalent to 1.80 in. of runoff from the drainage area.

5.5 Experience Data

There are no flood records for the dam site. However, during the field investigation, evidence of recent high water was observed at elevation 1769.7 ft. (MSL). This reservoir elevation corresponds to a peak outflow of 57 cfs.

5.6 Overtopping Potential

The maximum capacity of the spillways is 22,137 cfs which is greater than the PMF peak outflow of 12,515 cfs. The dam is not overtopped by the PMF, the peak elevation being 2.3 ft. below the top of dam.

5.7 Analysis of Downstream Impacts

During the field investigation, dwellings and highways located downstream of the dam were identified and referenced to the channel invert. The cross section locations used in the downstream channel routing are shown on Page D-2, Appendix D. The impacts of the PMF on dwellings located downstream of the dam are shown in Table 5.1. For the purposes of this analysis, a danger of loss of life was assumed to exist if the computed PMF water surface was above the first floor elevation of a structure. The drainage area of Gates Creek upstream of the confluence of tributary leading downstream from the dam was modeled into the analysis. The impacts shown in Table 5.1 are a result of the discharges from both Gates Creek and the dam. This situation occurs with two structures at location 1 and 1 structure at location 2. The road crossing at location 1 would be overtopped with the PMF.

5.8 Evaluation

The spillway of the Ischua Creek Watershed Dam No. 5 will safely pass the PMF without overtopping. The spillway is, therefore, assessed as "Adequate". Potential problems include:

- a. Erosion of the emergency spillway for the test flood condition. Because of the low probability of occurrence of the PMF, and because there is no cost effective means of preventing the erosion, no preventative recommendations are deemed necessary.
- b. The danger of loss of life and economic damage downstream of the dam for the test flood conditions

TABLE 5.1
SUMMARY OF DOWNSTREAM IMPACTS FOR PMF

| <u>Location #</u> (see page D-2 Appendix D) | <u>Location</u> | <u># of Dwellings</u> | <u>Structure Height above Streambed*</u> (ft) | <u>Peak Flow (cfs)</u> | <u>Peak Stage (ft)</u> | <u>Comments</u> |
|---|--|-----------------------|--|--------------------------------|--------------------------------|--|
| 1 | 2100' d/s of dam & just d/s of confluence w/Gates Creek | 2 | 9 | 23,893 | 12' | Danger of loss of life Road overtopped |
| | | 1 | 17 | 23,893 | 12' | |
| 2 | 200' d/s of of Location #1 | 1 | 7 | 23,897 | 12' | Danger of loss of life Road overtopped |
| | | 2 | ±30 | 23,902 | - | |
| 3 | 3300' d/s of #2 | 2 | ±30 | 23,895 | 10' | - |

*The structure height above the streambed is the difference between the first floor elevation and the channel invert.

SECTION 6 - STRUCTURAL STABILITY

6.1 Visual Observations

There does not appear to be significant displacement or distress associated with the embankments at this site. The dam appears to be in good condition at the present time.

6.2 Design and Construction Data

Analyses carried out during the design and construction phase included a slope stability analysis by the Swedish circle method. The parameters assumed were:

Upstream slope: 3H:1V, full drawdown, 8 ft. berm at 1771 ft,
 $\phi = 13^\circ$, $c = 650$ psf.

Downstream slope: 2.5H:1V, blanket drain, no berm,
 $\phi = 13^\circ$, $c = 650$ psf.

The factors of safety calculated were 1.64 for the upstream slope and 1.57 for the downstream slope. They are considered adequate according to the recommended Phase I guidelines.

6.3 Post Construction Changes

There have been no known changes to any of the embankments or structures at this dam.

6.4 Seismic Stability

The dam is located in seismic zone No. 3 and, in accordance with the recommended Phase I guidelines, a seismic stability analysis is warranted. This should be accomplished by a qualified registered professional engineer and should be made part of the record for this dam.

SECTION 7 - ASSESSMENT/RECOMMENDATIONS

7.1 ASSESSMENT

a. Safety

Examination of the available documents and visual inspections of Ischua Creek Watershed Dam No. 5 and appurtenant structures did not reveal any conditions which constitute a hazard to human life or property. The dam and its appurtenances are considered to be in good condition at the present time.

Using the Corps of Engineers screening criteria for review of spillway adequacy, it has been determined that the dam would not be overtopped for the spillway design flood of the full PMF. The principal and auxiliary spillway capacity are, therefore, judged as adequate.

b. Adequacy of Information

This report and its conclusions are based on visual inspection, interview data, contract drawings, and office hydrologic/hydraulic studies. This information and data are adequate for a Phase I inspection.

c. Need for Additional Investigations

It is recommended that the services of a qualified registered professional engineer be retained to evaluate:

- a. the source of the ponded water on the emergency spillway and the berm on the downstream face of the dam.
- b. the sloughing on the upstream slope to the left of the intake structure.

d. Urgency

The recommended investigation should be completed within 12 months of notification to owner and remedial actions resulting from these investigations completed in the subsequent 12 months. The remedial measures or actions listed below should be completed within one year from notification to owner.

7.2 RECOMMENDED MEASURES

- a. The results of the aforementioned investigations will determine the remedial measures concerning the ponded water on the emergency spillway and the berm on the downstream face of the dam, as well as the sloughing on the upstream slope.

- b. Install ladder rungs on the riser to provide access to the drain gate housing.
- c. Regrade and fill in the erosion gullies on the upstream slope.
- d. Remove vegetation on the slopes and crest of the embankment and the immediate downstream channel. Provide a program of periodic cutting and mowing of these surfaces.
- e. Clear debris from the trash racks and upstream slopes periodically.
- f. Implement a program of periodic inspection and maintenance of the dam and appurtenances including yearly operation and lubrication of the gate system. Document this information for future reference.
- g. Develop a formal written downstream warning system to alert the appropriate officials and residents in the event of an emergency.

APPENDIX A

VISUAL INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST

1) Basic Data

a. General

Name of Dam Ischua Creek Watershed Dam No. 5
Fed. I.D. # NY 00565 DEC Dam No. 25-2980
River Basin Allegheny
Location: Town Franklinville County Cattaraugus
Stream Name Gates Creek
Tributary of Ischua Creek
Latitude (N) 42° 18.8' Longitude (W) 78° 24.1'
Type of Dam Earth Embankment
Hazard Category High
Date(s) of Inspection April 2, 1981
Weather Conditions Sunny, Windy, 50°
Reservoir Level at Time of Inspection Approximately elevation 1753.5 ft.

b. Inspection Personnel Mr. Robert Farrell, Mr. Ken Avery, Mr. James Reynolds,
Mr. Jeff Hardin

c. Persons Contacted (including Address & Phone No.)
U.S. Soil Conservation Service, Rm 771-Federal Bldg., So. Clinton St., Syracuse, N.Y.
State Construction Engineer: Philip "Skip" Nelson 1-315-423-5502
Area 1 Project Engineer (Batavia): Pete Wright 1-716-343-3664
Contracting Ofc. for Ischua Creek Watershed: Ed Smith - contacted through Pete Wright

d. History:
Date Constructed 1961 Date(s) Reconstructed
Designer U.S.D.A. Soil Conservation Service
Constructed by
Owner Ischua Creek County Small Watershed Protection District

2) Embankment

a. Characteristics

- (1) Embankment Material Silty sand and gravel. Homogeneous
- (2) Cutoff Type Trench cut into natural ground, variable depth, generally 12 feet wide at bottom. Cut into silty sand and gravel
- (3) Impervious Core None
- (4) Internal Drainage System Blanket drain two feet thick from 40 downstream of centerline to the downstream toe. Drains to a cobble drain along the downstream toe.
- (5) Miscellaneous Side slopes 2.5H:1V downstream and 3H:1V upstream

b. Crest

- (1) Vertical Alignment Good
- (2) Horizontal Alignment Good
- (3) Surface Cracks Not noted
- (4) Miscellaneous _____

c. Upstream Slope

- (1) Slope (Estimate) (V:H) 1 vertical to 3 horizontal
- (2) Undesirable Growth or Debris, Animal Burrows Brush and grass growth light. No animal burrows noted
- (3) Sloughing, Subsidence or Depressions 3 sloughs approximately 3 feet in diameter located approximately 30 feet left of the intake structure, approximately 5 to 10 feet above the low level inlet

(4) Slope Protection Grass, no riprap on upstream slope, 10 feet berm at waterline. Approximately 2 inches of wave erosion at waterline

(5) Surface Cracks or Movement at Toe None noted

d. Downstream Slope

(1) Slope (Estimate - V:H) 1 vertical to 2.5 horizontal

(2) Undesirable Growth or Debris, Animal Burrows None noted

(3) Sloughing, Subsidence, or Depressions None noted

(4) Surface Cracks or Movement at Toe None noted

(5) Seepage None noted. Entire slope was moist but no flow was observed

(6) External Drainage System (Ditches, Trenches, Blanket) A cobble drain extends along the downstream slope to the left of the outlet conduit. The drain was moist but no flow was observed. Drainage should be provided for the 10 foot berm crest

(7) Condition Around Outlet Structure Generally good

(8) Seepage Beyond Toe None noted

e. Abutments - Embankment Contact

Some erosion due to natural ground or surface water flow

(1) Erosion at Contact Erosion gullies up to 6" deep at left upstream abutment contact resulting from surface runoff. Drainage path should be provided

(2) Seepage Along Contact None noted

3) Drainage System

(a) Description of System 2 ft. thick blanket drain from 40 ft. downstream of centerline to downstream toe. Drains to a cobble drain along the toe which drains to the outlet channel.

(b) Condition of System Appears to be functional. Cobble drain slightly overgrown.

(c) Discharge from Drainage System None noted

4) Instrumentation (Monumentation/Surveys, Observation Wells, Weirs, Piezometers, etc.) None installed

5) Reservoir

a. Slopes Appear stable and in good condition

b. Sedimentation Very minor accumulation

c. Unusual Conditions Which Affect Dam Heavy moisture in emergency spillway channel

6) Area Downstream of Dam

a. Downstream Hazard (No. of homes, highways, etc) Refer to Table 5.1 for a summary of downstream dwellings and highways

b. Seepage, unusual growth None noted

c. Evidence of movement beyond toe of Dam None noted

d. Conditions of Downstream Channel Generally good. Some erosion above rip rap, should be repaired.

7) Spillway(s) (including Discharge Conveyance Channel)

Principal spillway: Drop inlet structure with outlet conduit to impact basin. Vegetated

earth emergency spillways: 350 ft. wide at right abutment.

a. General Good

b. Condition of Service Spillway Excellent

c. Condition of Emergency Spillway Generally good, spillway (left) shows heavy concentration of ponded water. This is probably the result of natural groundwater and spring thaw

d. Condition of Discharge Conveyance Channel Channel banks eroded above rip rap

8) Reservoir Drain/Outlet

Type: Pipe X Conduit Other

Material: Concrete Metal X Other

Size: 12" Length 48'

Invert Elevations: Entrance Exit

Physical Condition (Describe): Unobservable X

Material:

Joints: Alignment

Structural Integrity:

Hydraulic Capability:

Means of Control: Gate Valve X Uncontrolled

Operation: Operable Inoperable X Other

Present Condition (Describe): No handle

9) Structural

- a. Concrete Surfaces N/A

- b. Structural Cracking N/A

- c. Movement - Horizontal & Vertical Alignment (Settlement) N/A

- d. Junctions with Abutments or Embankments N/A

- e. Drains - Foundation, Joint, Face N/A

- f. Water Passages, Conduits, Sluices N/A

- g. Seepage or Leakage N/A

- h. Joints - Construction, etc. N/A

- i. Foundation N/A

- j. Abutments N/A

- k. Control Gates N/A

- l. Approach & Outlet Channels N/A

- m. Energy Dissipators (Plunge Pool, etc) N/A

- n. Intake Structures N/A

- o. Stability N/A

- p. Miscellaneous N/A

10) Appurtenant Structures (Power House, Lock, Gatchouse, Other)

- a. Description and Condition None

APPENDIX B

ENGINEERING DATA

APPENDIX B

| <u>TITLE</u> | <u>PAGE</u> |
|--|-------------|
| Cover Sheet | B-2 |
| Plan of Storage Areas | B-3 |
| Damsite | B-4 |
| Profiles | B-5 |
| Seepage Drain Details | B-6 |
| Plan-Profile of Principal Spillway | B-7 |
| Riser Details | B-8 |
| Cradle, Collar & Bent Details | B-9 |
| Gate Well, Trash Racks & Misc. Details | B-10 |
| Fence Details | B-11 |

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- SHEET 1 COVER S
SHEET 2 PLAN OF
SHEET 3 DAMSITE
SHEET 4 PROFILE
SHEET 5 SEEPAGE
SHEET 6 PLAN-PR
SHEET 7 RISER D
SHEET 8 CRADLE
SHEET 9 GATE W
SHEET 10 FENCE

ISCHUA CREEK WATERSHED PROJECT

FLOODWATER RETARDING DAM NO. 5

565

| | | |
|--------------------|--------|-------------|
| DRAINAGE AREA | 4096 | Acres |
| TOTAL STORAGE | 1085 | Acre ft. |
| WATER SURFACE AREA | 8.5 | Acres |
| HEIGHT OF DAM | 52 | Feet |
| VOLUME OF FILL | 214000 | Cubic Yards |

BUILT UNDER THE WATERSHED PROTECTION AND
FLOOD PREVENTION ACT

by

ISCHUA CREEK SMALL WATERSHED DISTRICT

with the assistance of

SOIL CONSERVATION SERVICE

of the

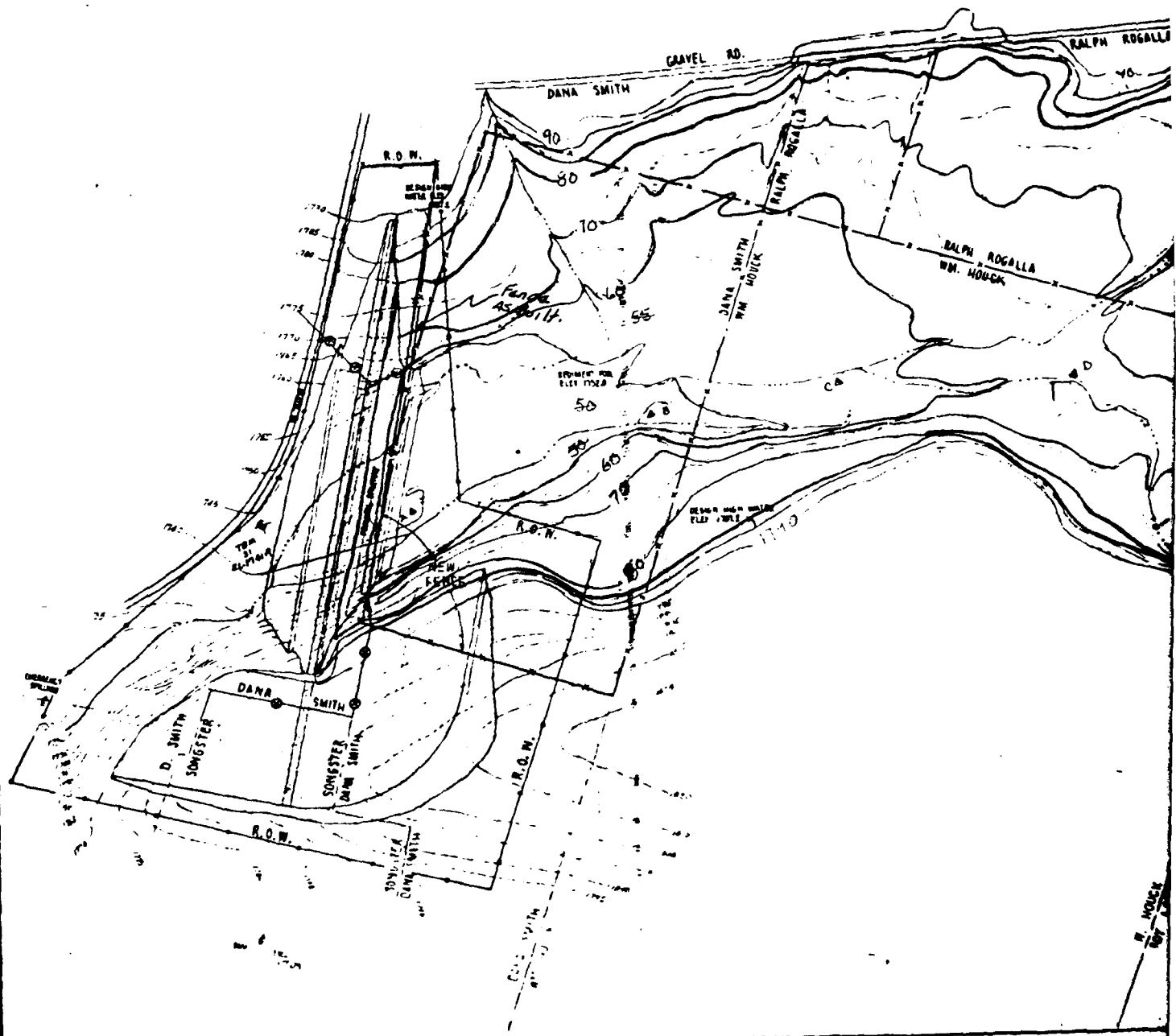
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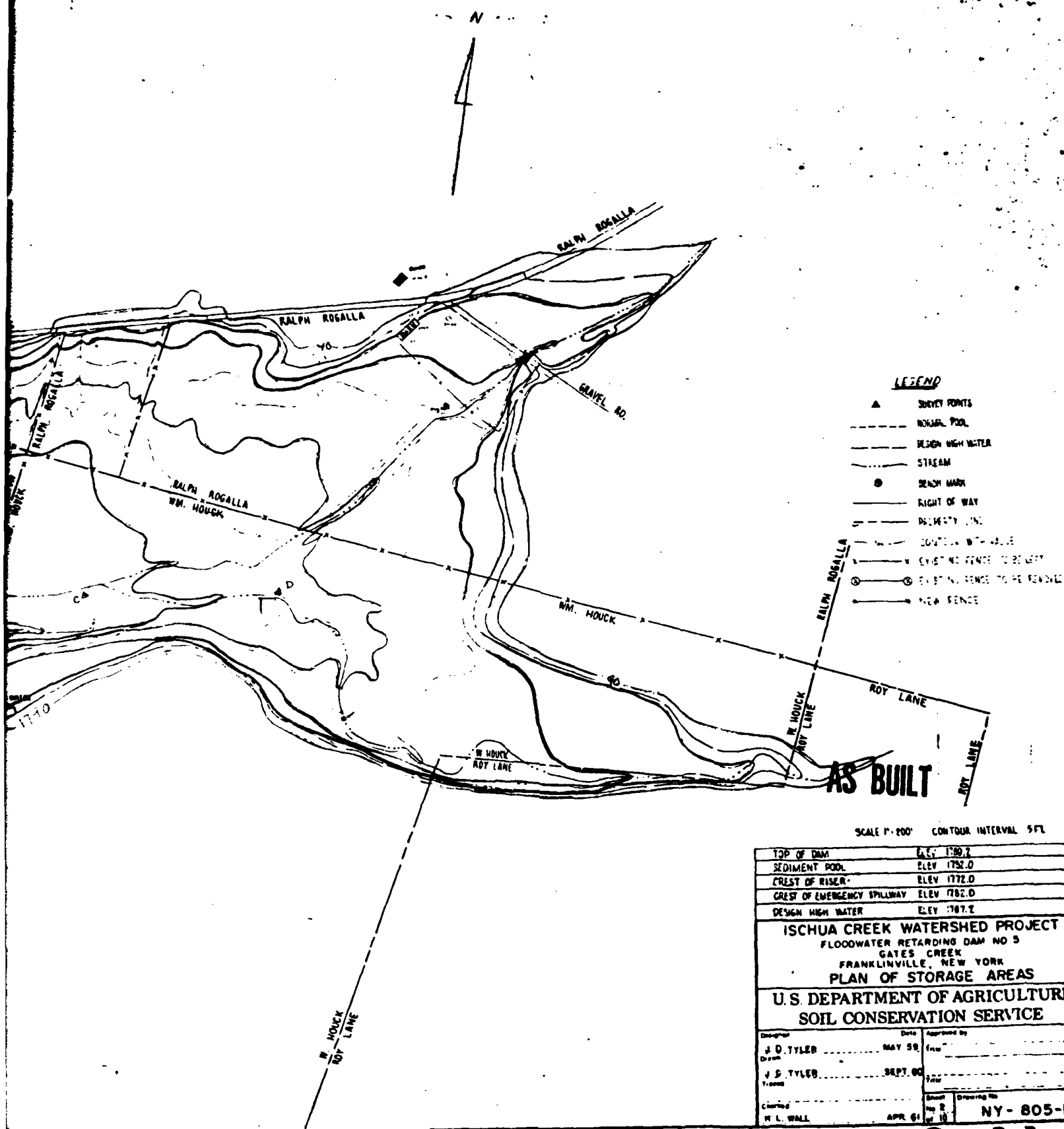
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SHEET 3 DAMSITE
SHEET 4 PROFILES
SHEET 5 SEEPAGE DRAIN DETAILS
SHEET 6 PLAN-PROFILE OF PRINCIPAL SPILLWAY
SHEET 7 RISER DETAILS
SHEET 8 CRADLE, COLLAR & BENT DETAILS
SHEET 9 GATE WELL, TRASH RACKS & MISC. DETAILS
SHEET 10 FENCE DETAILS

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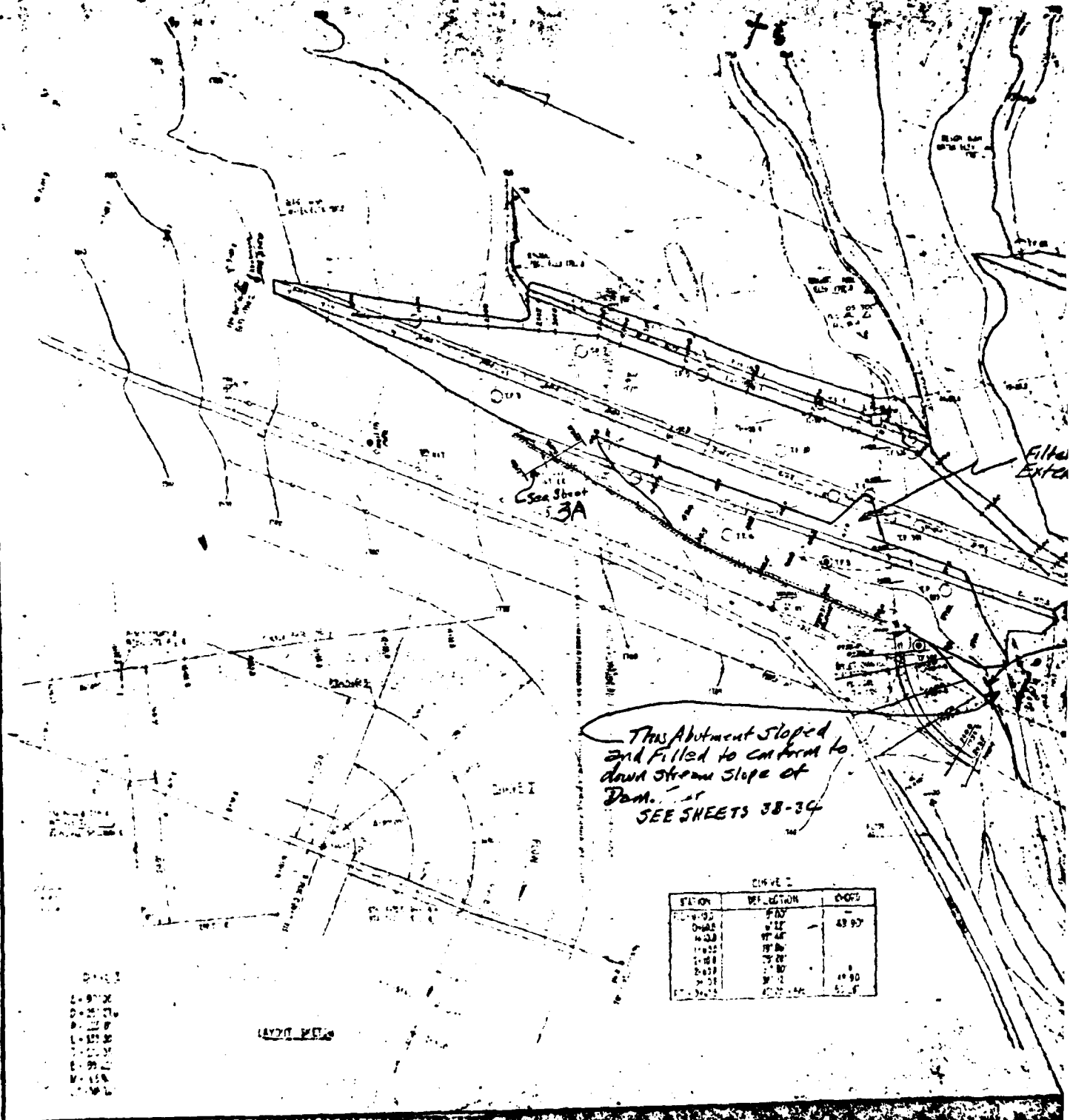
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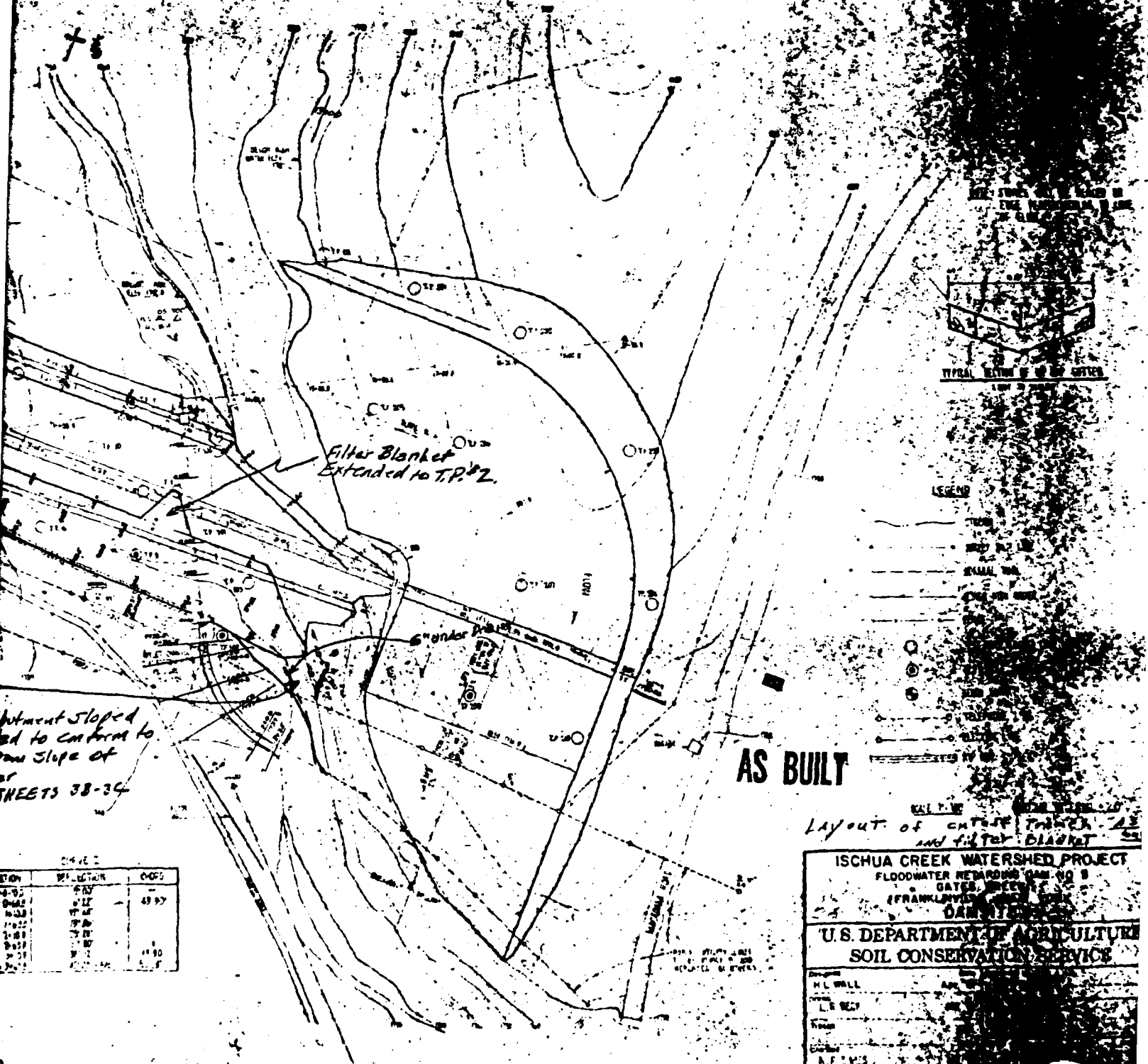




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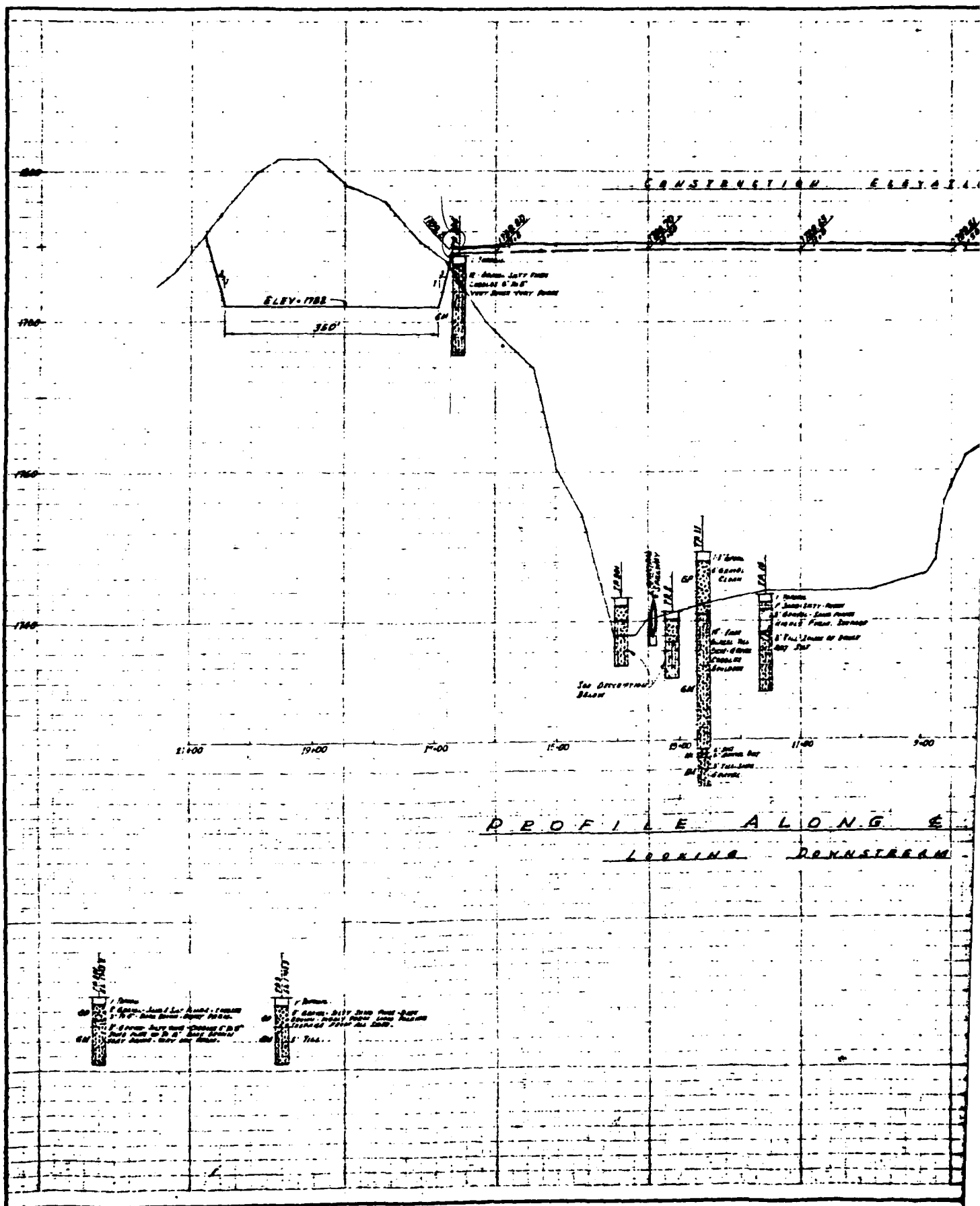
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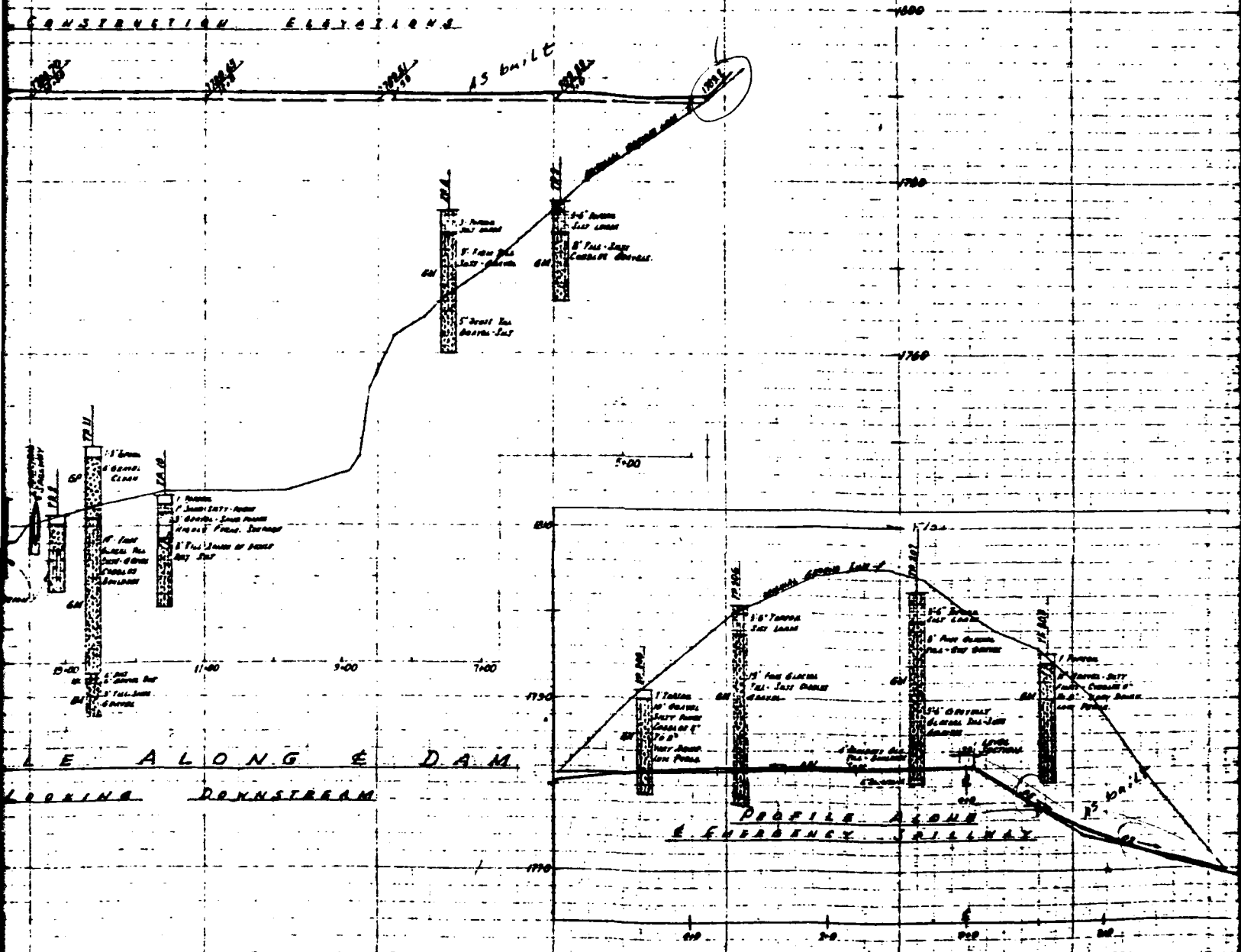
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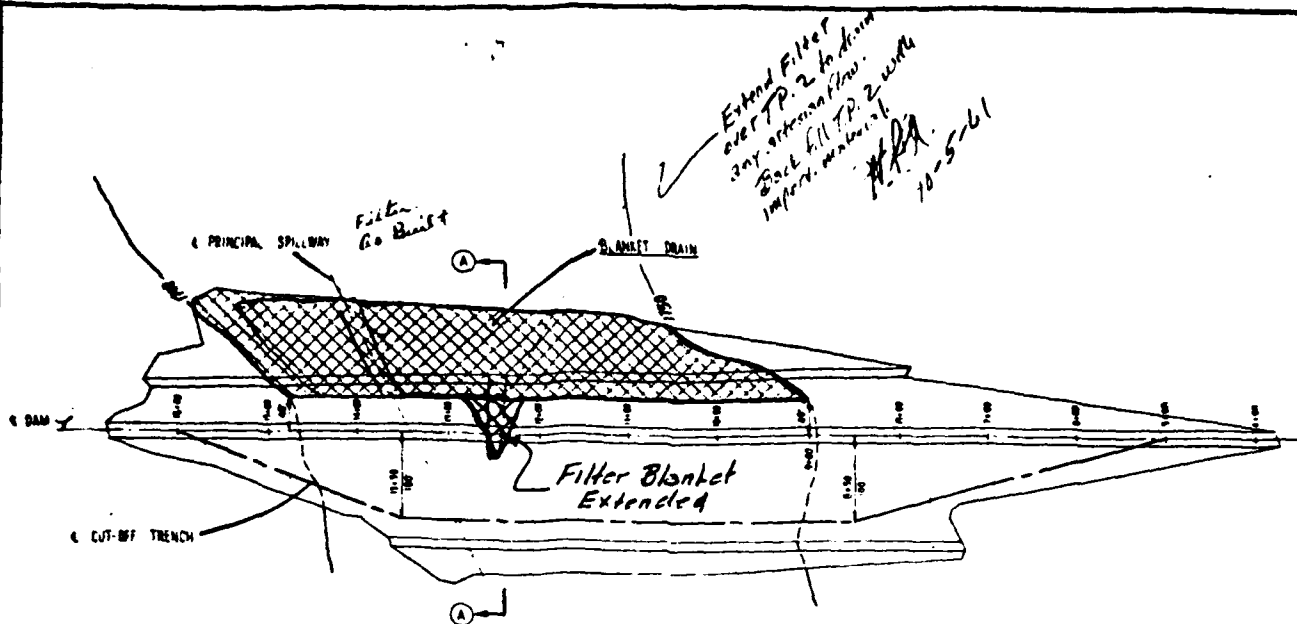
ISCHUA CREEK WATERSHED PROJECT
FLOODWATER REGARDING DAM NO. 3
GATES, BRIDGE
FRANKLIN, MISSOURI
DAM SITE

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

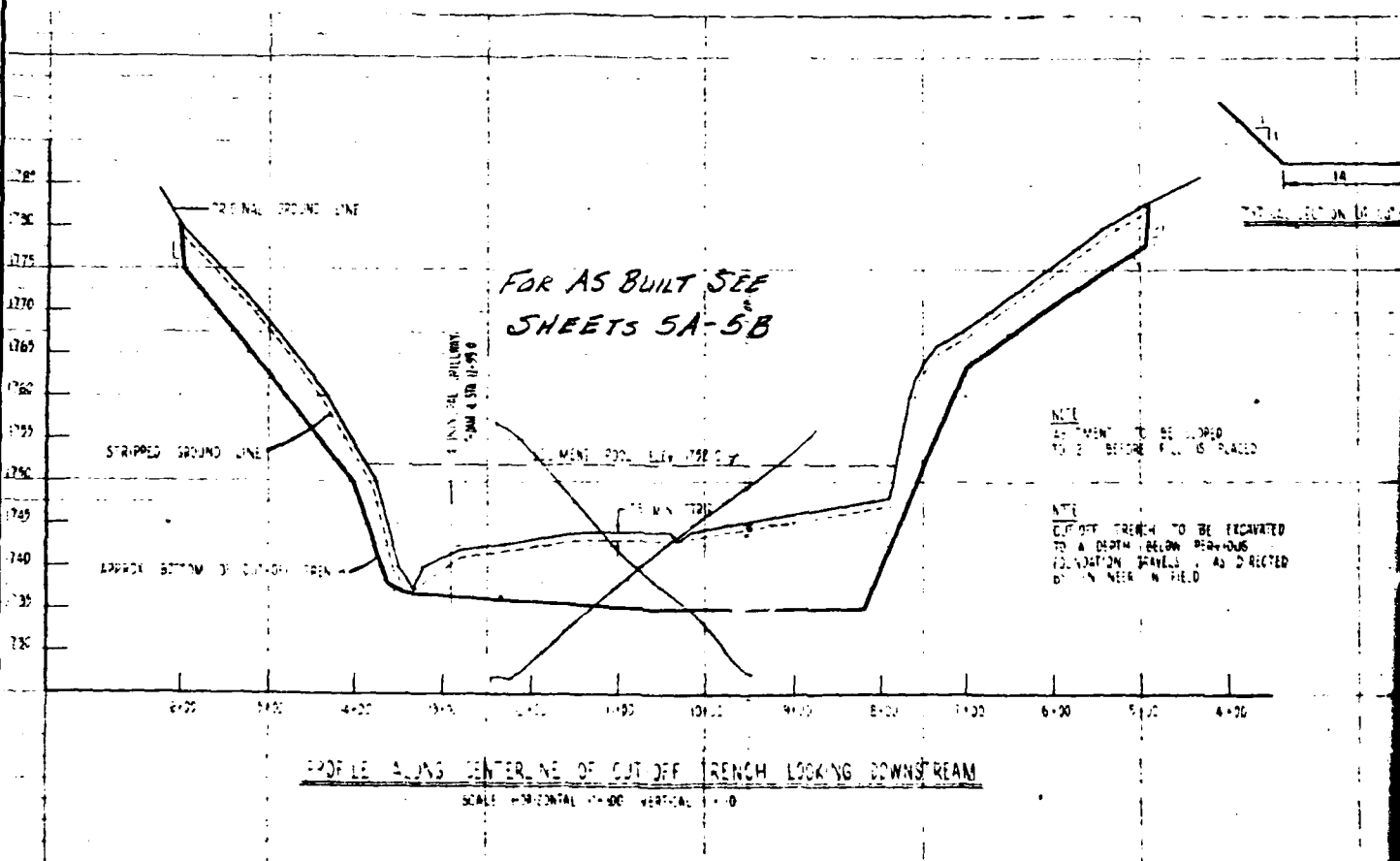
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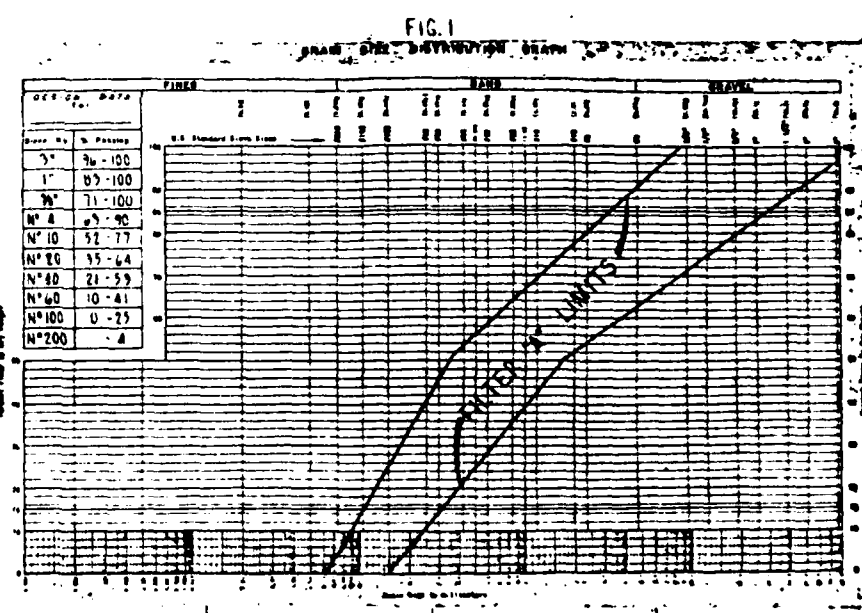
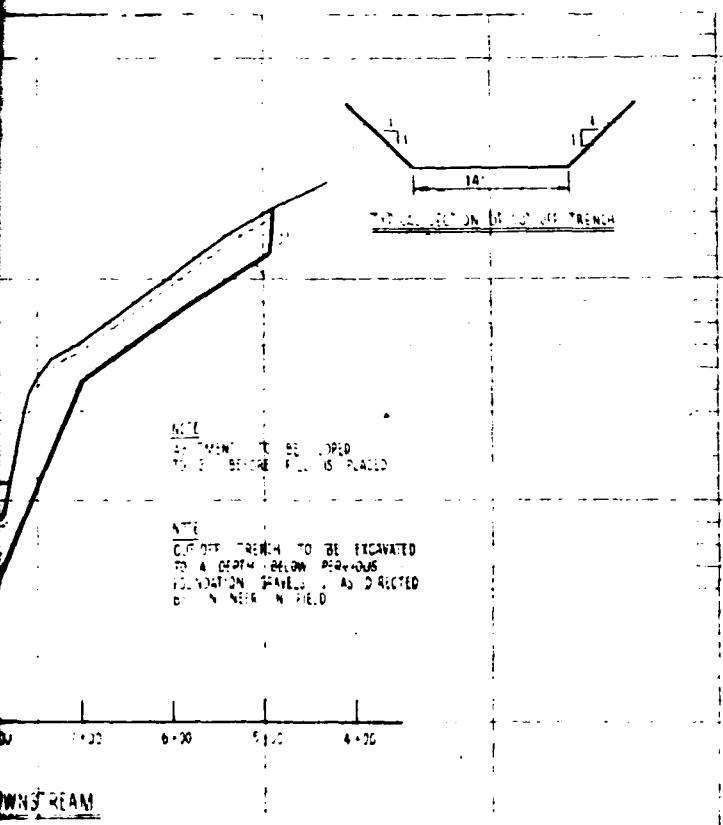
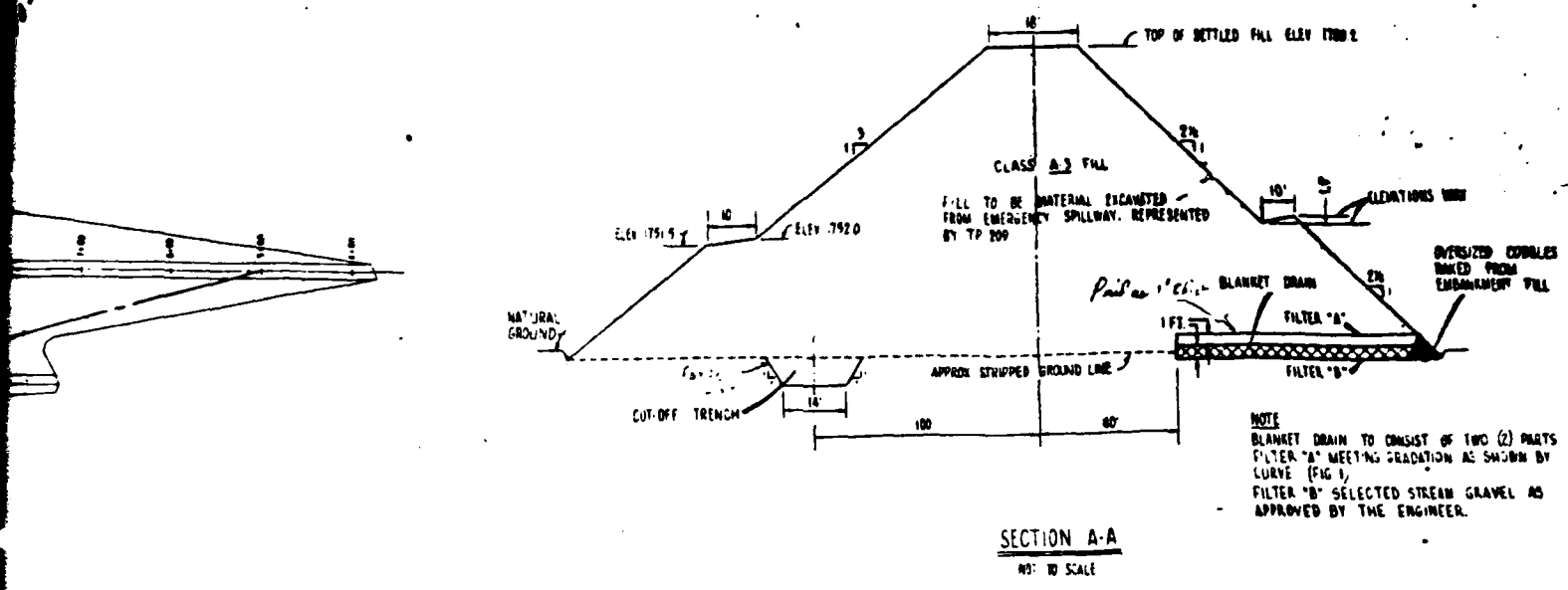




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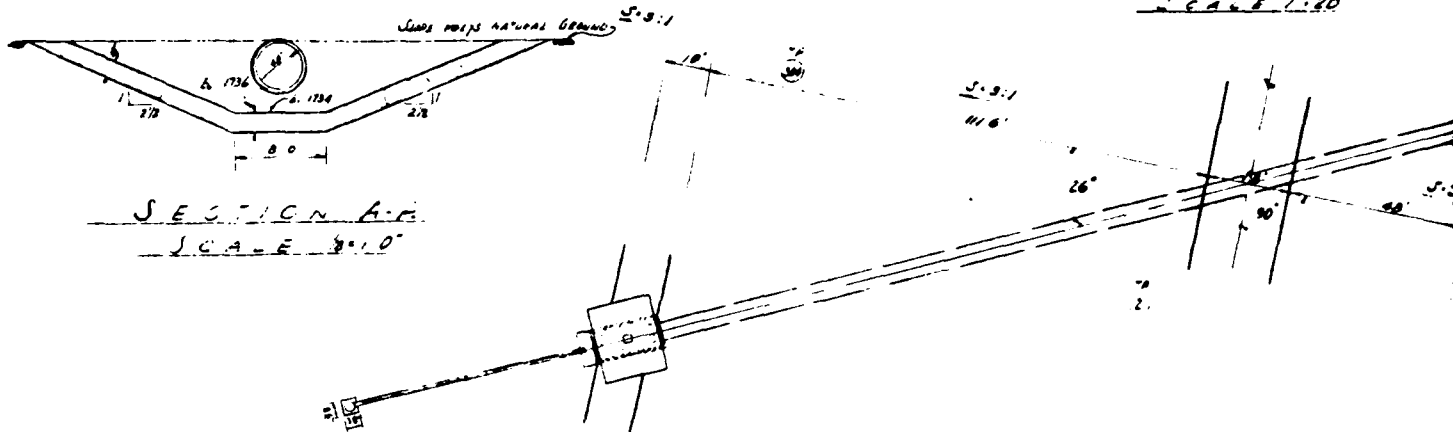


AS BUILT

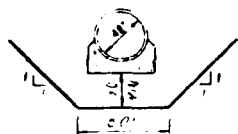
| | | | |
|--|----------------|----------------------------|--------------------------------|
| ISCHUA CREEK WATERSHED PROJECT FLOODWATER RETARDING DAM NO 5 GATES CREEK FRANKLINVILLE, NEW YORK SEEPAGE DRAIN DETAILS | | | |
| U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE | | | |
| Designed by A. F. SIMES | Date APR 61 | Checked by S. J. HERMAN | Title Seepage Drain Details |
| Drawn by S. J. HERMAN | Date APR 61 | Checked by S. J. HERMAN | Title Seepage Drain Details |
| Project 2 ROSSIER | Date APR 61 | Checked by S. J. HERMAN | Title Seepage Drain Details |
| Sheet No. 3 | | | Drawn by No. 3 |
| NY-805 | | | B-6 |

2

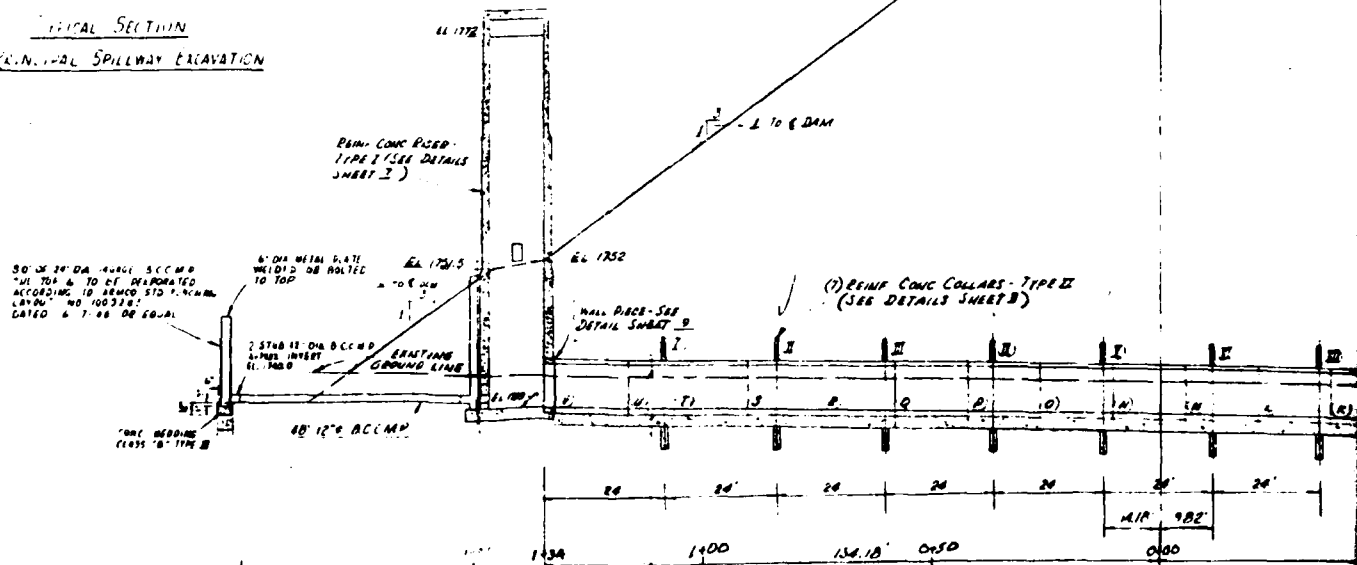
PLAN VIEW SCALE 1"=20'



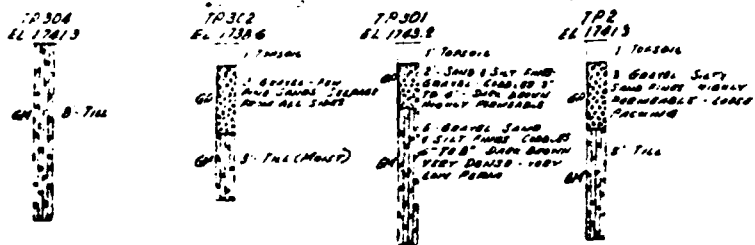
SECTION A-A SCALE 3"=10'



CROSS SECTION PRINCIPAL SPILLWAY EXCAVATION



SOILS DATA



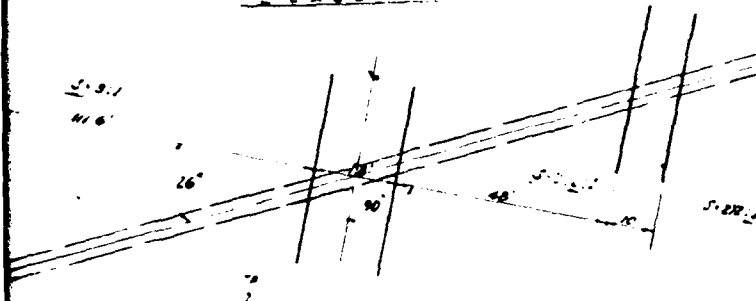
PROFILE ALONG & PRINCIPAL SCALE HOR 1"=20' VERT 1"=8'

NOTE:

ALL GRAVELS (G), AS REPRESENTED ON THE LOGS OF T.P. 2 FROM 1' TO 6', SHALL BE REMOVED FROM UNDER THE DAM WITH COMPACTED FILL (CLASS A-3), IF NECESSARY PRIOR TO THE CONSTRUCTION.

DATE OF GEOLOGICAL INVESTIGATION: OCT. 1960
UNIFIED SOIL CLASSIFICATION: BY VISUAL INSPECTION.

PLAN VIEW SCALE 1"=20'

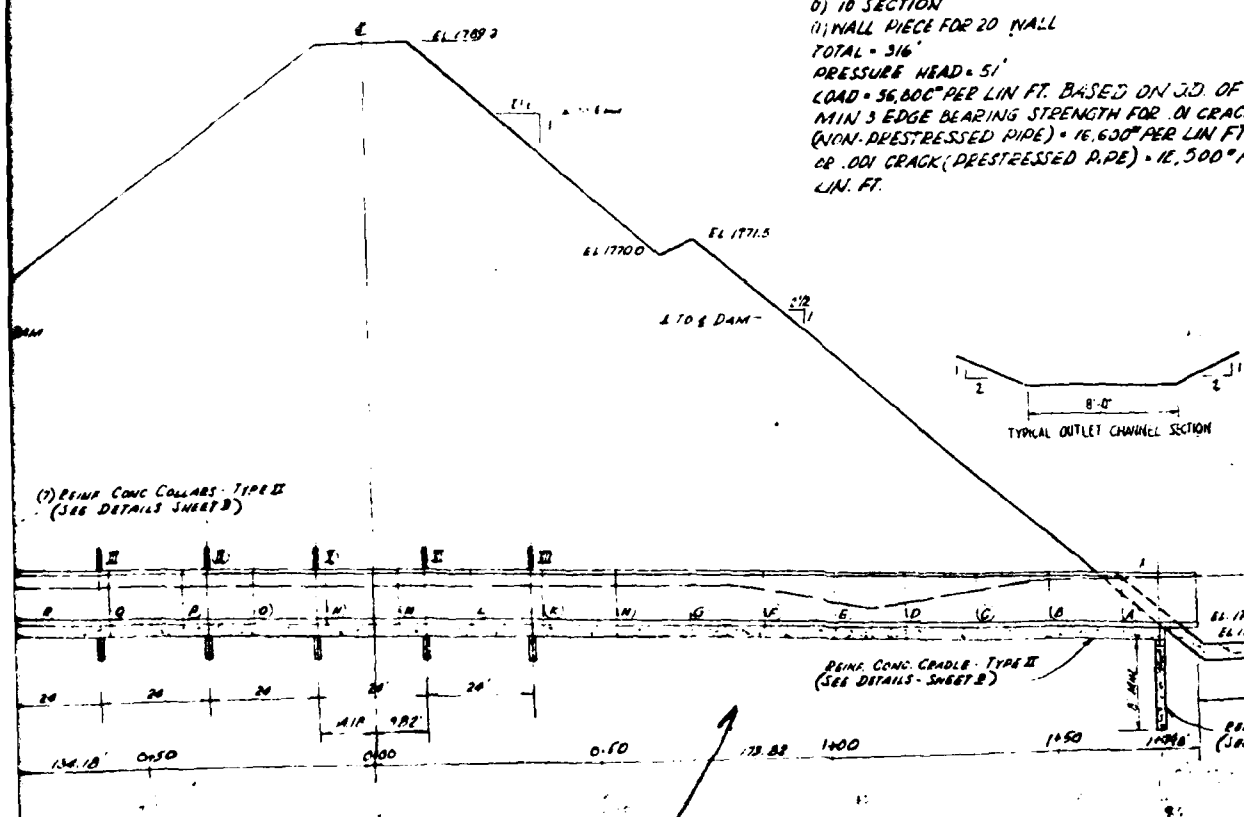


48" INSIDE DIA CONCRETE WATER PIPE
(9) 16 SECTIONS
(1) 10 SECTION
(1) WALL PIECE FOR 20' WALL
TOTAL = 316'
PRESSURE HEAD = 51'
LOAD = 36,800* PER LIN. FT. BASED ON J.D. OF 60"
MIN. 3' EDGE BEARING STRENGTH FOR IN CRACK
(NON-PRESTRESSED PIPE) = 16,600* PER LIN. FT.
OR .001 CRACK (PRESTRESSED PIPE) = 12,500* PER
LIN. FT.

| PT | JUST FROM OUTLET OF 48" PIPE | INVERT 68" PIPE |
|----|------------------------------------|--------------------|
| A | 16 | 1786.20 |
| B | 32 | 1786.42 |
| C | 48 | 1786.64 |
| D | 64 | 1786.85 |
| E | 80 | 1787.05 |
| F | 96 | 1787.26 |
| G | 112 | 1787.45 |
| H | 128 | 1787.63 |
| I | 144 | 1787.84 |
| J | 160 | 1788.00 |
| K | 176 | 1788.18 |
| L | 192 | 1788.34 |
| M | 208 | 1788.49 |
| N | 224 | 1788.61 |
| O | 240 | 1788.73 |
| P | 256 | 1788.84 |
| Q | 272 | 1788.90 |
| R | 288 | 1788.97 |
| S | 298 | 1788.99 |
| T | 314 | 1789.00 |

| | | |
|----|-----|---------|
| U | 292 | 1788.97 |
| V | 280 | 1788.88 |
| W | 268 | 1788.74 |
| X | 250 | 1788.57 |
| Y | 236 | 1788.36 |
| Z | 222 | 1788.07 |
| AA | 208 | 1787.82 |

NOTE: PIPE LENGTHS ARE MINIMUM
AND DO NOT INCLUDE CREEP.



PROFILE ALONG & PRINCIPAL SPILLWAY SCALE HORIZ 1"=20' VERT 1"=5'

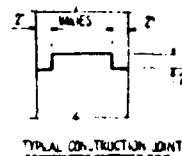
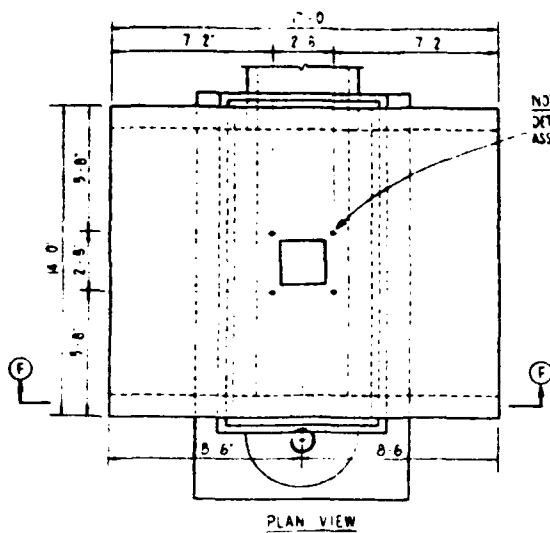
SEE SHEETS 6A-6B
EXC. & BACKFILL
PRINC. SPILLWAY

NOTE:
ALL GRAVELS (G), AS REPRESENTED ON THE LOGS OF TP 2 & TP 302
FROM 1' TO 6', SHALL BE REMOVED FROM UNDER THE UPRIGHT & REPLACED
WITH CONCRETE FILL (CLASS A-3), IF NECESSARY PRIOR TO PLACEMENT
OF THE CRADLE.

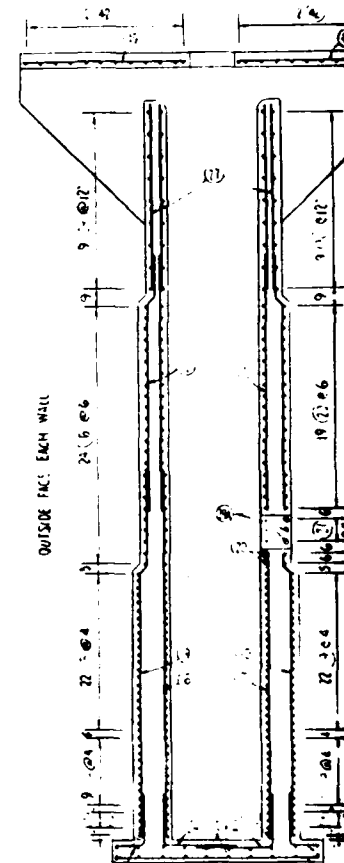
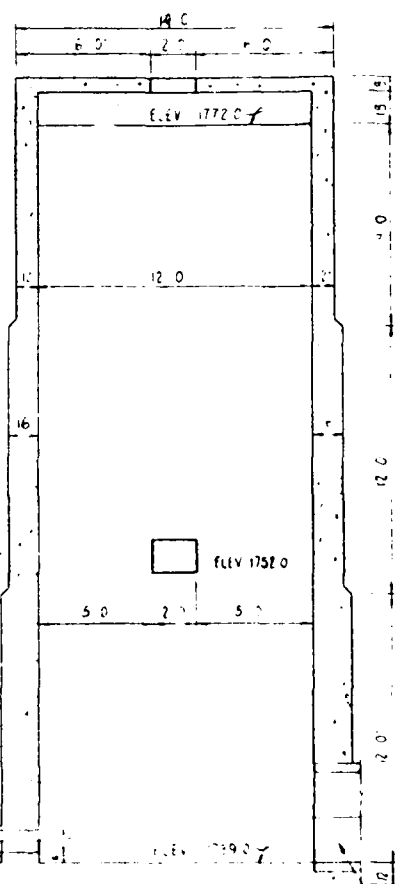
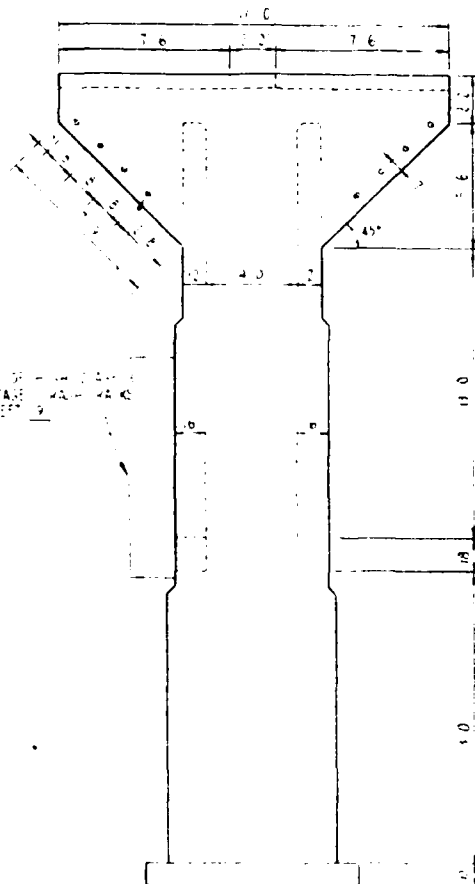
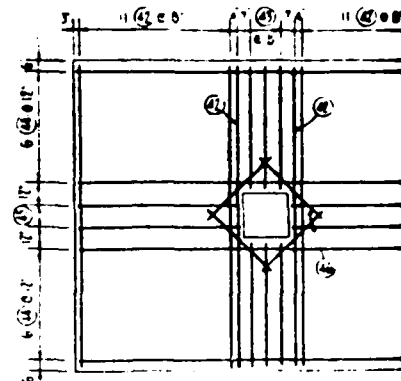
checked by J. F. F. / 4/20/62
Recompute
Set and extend
filling basin dimensions
USA
4/20/62

AS BUILT

| | | | |
|---|-----------------|----------------------------|--|
| ISCHUA CREEK WATERSHED PROJECT FLOODWATER RETARDING DAM NO 5 GATES CREEK FRANKLINVILLE, NEW YORK | | | |
| PLAN-PROFILE OF PRINCIPAL SPILLWAY | | | |
| U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE | | | |
| Designed H. L. WALL | Date Apr '61 | Approved by [Signature] | Sheet No. 6 of 10 Drawing No. NY-805-6 |
| Drawn G. C. ELIAS | Date Apr '61 | Checked [Signature] | |
| Checked S. HOSNER & J. F. F. / 4/20/62 | | | |



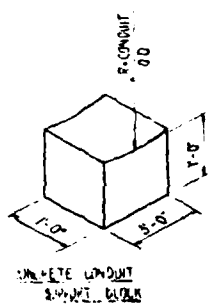
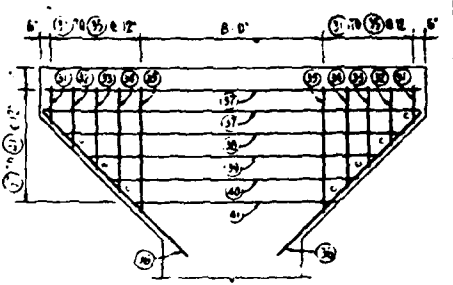
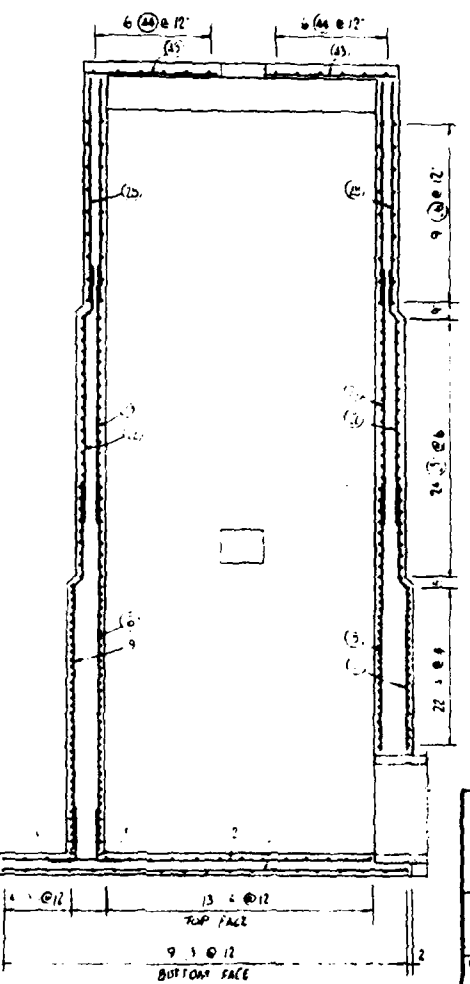
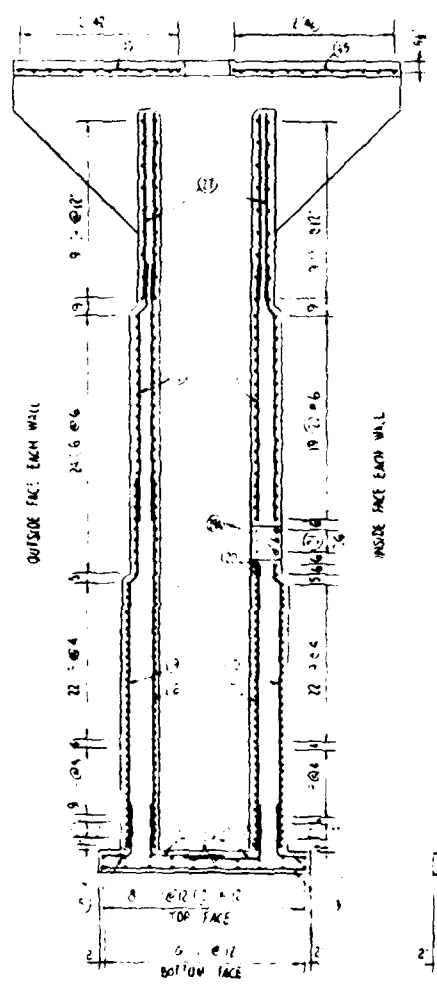
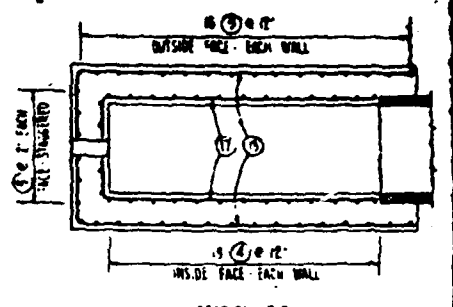
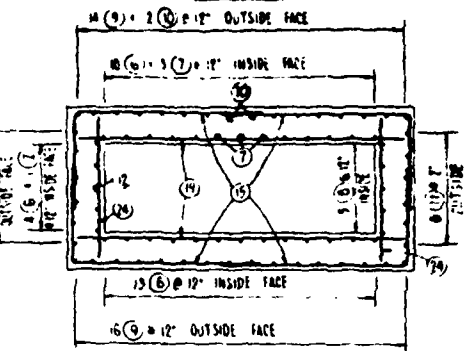
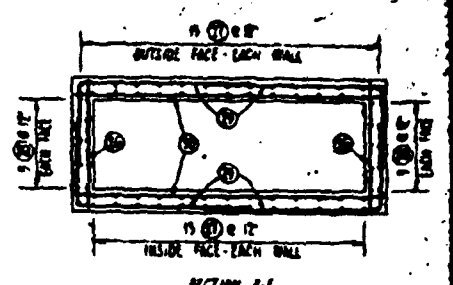
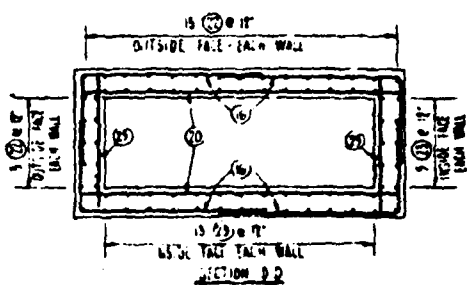
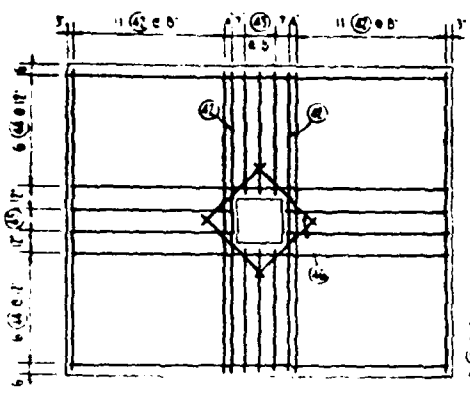
SLIDE GATE DETAILS
 HYDRAULIC GATE ARMED MODEL 95 OR APPROVED EQUAL
 REMOVABLE LIFT H.A.
 OPERATING HEAD 12 FEET
 STEM LENGTH 3 FEET
 FRAME HEIGHT MINIMUM
 BRONZE SEAT FACINGS & LIFT NUTS
 COATE STEM GUIDES & ANCHOR BOLTS ACCORDING TO
 MANUFACTURERS RECOMMENDATIONS



UPSTREAM ELEVATION

SECTION ON CENTERLINE

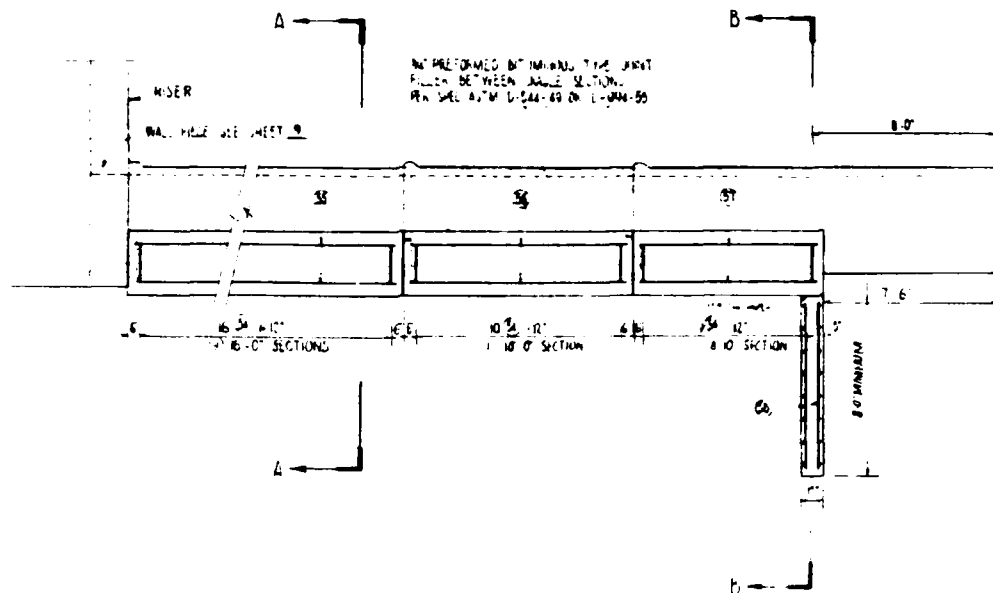
SECTION A-A



AS BUILT

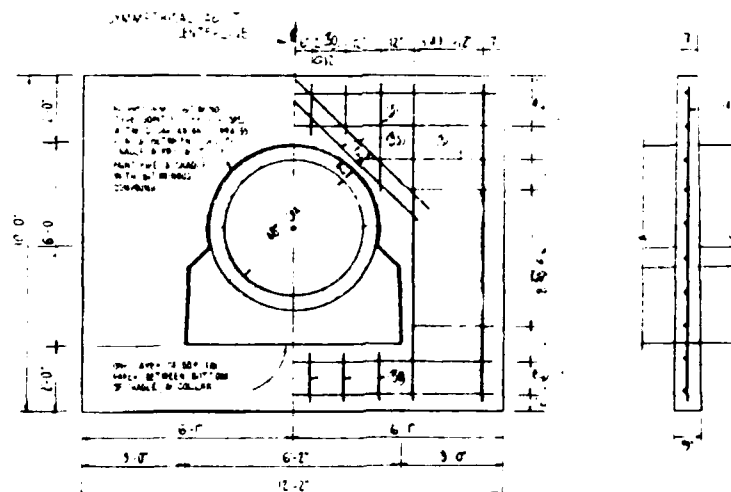
| | | | |
|--|---|--|---|
| ISCHUA CREEK WATERSHED PROJECT FLOODWATER RETARDING DAM NO 5 GATES CREEK FRANKLINVILLE, NEW YORK RISER DETAILS | | | |
| U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE | | | |
| Location Date Drawn Checked Approved | Date 11-2-54 11-2-54 11-2-54 11-2-54 11-2-54 | Approved by 11-2-54 11-2-54 11-2-54 11-2-54 11-2-54 | Sheet 1 of 1 Drawing No. NY-805- |

2 B-8



DETAIL OF REINFORCED CONCRETE CRADLE - 6 BLN

SCALE 1/4" = 1'-0"

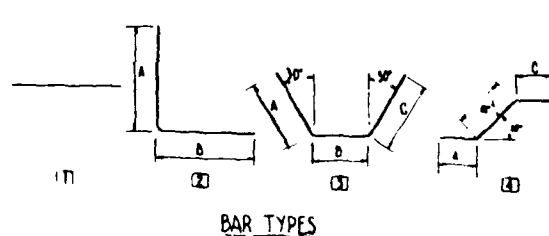
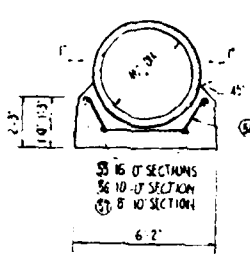
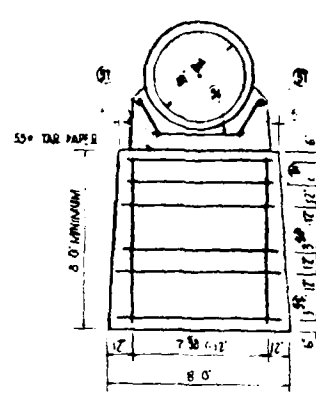
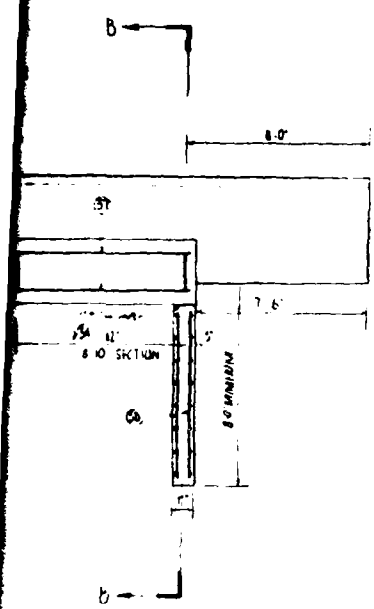


DETAIL OF REINFORCED CONCRETE ANTI-DEEP COLLAR - 7 RECU'D

SCALE 1/4" = 1'-0"

GENERAL NOTES

1. ALL CONCRETE SHALL BE CLASS 'B' & OF THE PORTLAND CEMENT, TYPE I WITH AN AIR-ENRICHMENT OR TYPE IA, SHALL BE USED.
2. ALL REINFORCING STEEL SHALL BE LAPPED 17" JO BAR DIAMETERS.
3. ALL REINFORCING STEEL, PLACED IN CONCRETE THE SHOULDER, SHALL HAVE A MINIMUM OF 3" WHERE FORMS ARE USED, BARS SHALL HAVE 1" OF CONCRETE.
4. ALL EXPOSED EDGES OF CONCRETE SHALL HAVE UNLESS OTHERWISE NOTED.



- GENERAL NOTES:**
1. ALL CONCRETE SHALL BE CLASS 'B' OF THE TYPE NOTED
 2. PORTLAND CEMENT, TYPE I WITH AN AIR-ENTRAINING ADMIXTURE OF TYPE IA, SHALL BE USED
 3. ALL REINFORCING STEEL SHALL BE LAPPED A MINIMUM OF 30 BAR DIAMETERS
 4. ALL REINFORCING STEEL, PLACED IN CONCRETE POURED AGAINST THE GROUND, SHALL HAVE A MINIMUM OF 3" OF CLEAR COVER WHERE FORMS ARE USED, BARS SHALL HAVE A MINIMUM COVER OF 2" OF CONCRETE.
 5. ALL EXPOSED EDGES OF CONCRETE WILL HAVE A 3/4" CHAMFER, UNLESS OTHERWISE NOTED

| STEEL SCHEDULE | | | | | | | | | |
|----------------|---------------------------|-----|------|--------|-----|------|------|-----|-----------|
| MARK | LOCATION | BAR | SIZE | LENGTH | NO. | A | B | C | TOTAL WT. |
| 1 | TOP SLAB | 10 | 5 | 18-0 | 1 | | | | 4.20 |
| 2 | | 7 | 5 | 16-5 | 1 | | | | 3.75 |
| 3 | | 13 | 5 | 9-0 | 1 | | | | 2.07 |
| 4 | | 26 | 5 | 5-0 | 2 | 2.0 | 5.0 | | 1.50 |
| 5 | | 42 | 6 | 5-0 | 2 | 2.0 | 1-0 | | 1.89 |
| 6 | VERT. (N. OF B. SL.) | 17 | 6 | 16-6 | 1 | | | | 4.45 |
| 7 | | 3 | 6 | 17-5 | 1 | | | | 3.71 |
| 8 | | 3 | 6 | 17-0 | 1 | | | | 3.60 |
| 9 | CR. THRU OF SL. | 26 | 6 | 16-8 | 4 | 11-9 | 0-6 | 2-5 | 6.89 |
| 10 | | 7 | 6 | 12-9 | 4 | 11-9 | 0-6 | 0-6 | 3.25 |
| 11 | | 6 | 6 | 11-1 | 4 | 1-4 | 0-6 | 4-3 | 3.11 |
| 12 | CR. THRU OF SL. | 7 | 6 | 14-9 | 1 | | | | 3.45 |
| 13 | CR. THRU OF SL. | 8 | 6 | 18-0 | 1 | 1-0 | 0-0 | | 4.40 |
| 14 | | 10 | 6 | 19-4 | 2 | 4-5 | 0-0 | | 5.08 |
| 15 | | 24 | 6 | 8-0 | 2 | 4-5 | 1-2 | | 3.77 |
| 16 | | 50 | 6 | 11-2 | 2 | 4-4 | 1-1 | | 4.95 |
| 17 | CR. THRU OF SL. | 20 | 6 | 15-0 | 2 | 2-0 | 0-0 | | 3.00 |
| 18 | | 20 | 6 | 15-2 | 2 | 1-3 | 10-0 | | 3.03 |
| 19 | | 44 | 6 | 10-0 | 1 | | | | 6.60 |
| 20 | | 42 | 6 | 14-3 | 1 | | | | 5.90 |
| 21 | | 8 | 6 | 6-0 | 1 | | | | 1.68 |
| 22 | VERTICAL (N. OF B. SL.) | 10 | 6 | 17-0 | 4 | 3-5 | 0-6 | 1-3 | 4.80 |
| 23 | VERTICAL (N. OF B. SL.) | 10 | 6 | 11-6 | 1 | | | | 3.15 |
| 24 | HORIZONTAL (N. OF B. SL.) | 44 | 6 | 1-0 | 1 | | | | 3.20 |
| 25 | | 44 | 6 | 6-3 | 1 | | | | 5.80 |
| 26 | | 10 | 6 | 5-6 | 1 | | | | 2.50 |
| 27 | VERTICAL (N. OF B. SL.) | 10 | 6 | 8-5 | 1 | | | | 2.82 |
| 28 | | 20 | 6 | 2-2 | 1 | | | | 0.55 |
| 29 | CR. THRU OF SL. | 56 | 6 | 11-0 | 2 | 1-9 | 7-9 | | 8.14 |
| 30 | | 8 | 6 | 11-0 | 2 | 4-1 | 0-11 | | 6.66 |
| 31 | ANTI-VORTEX | 10 | 6 | 10-6 | 1 | | | | 2.83 |
| 32 | | 8 | 5 | 1-9 | 1 | | | | 1.47 |
| 33 | | 8 | 5 | 2-9 | 1 | | | | 2.20 |
| 34 | | 8 | 5 | 1-9 | 1 | | | | 1.47 |
| 35 | | 8 | 5 | 2-9 | 1 | | | | 2.20 |
| 36 | | 8 | 5 | 9-0 | 1 | | | | 7.12 |
| 37 | | 8 | 5 | 16-6 | 1 | | | | 13.27 |
| 38 | | 4 | 5 | 15-0 | 1 | | | | 6.04 |
| 39 | | 4 | 5 | 15-0 | 1 | | | | 6.04 |
| 40 | | 4 | 6 | 11-0 | 1 | | | | 4.42 |
| 41 | | 4 | 9 | 0-0 | 1 | | | | 5.67 |
| 42 | TOP SLAB | 24 | 6 | 19-6 | 1 | | | | 9.24 |
| 43 | | 6 | 6 | 5-6 | 1 | | | | 3.12 |
| 44 | | 12 | 5 | 15-6 | 1 | | | | 10.62 |
| 45 | | 4 | 5 | 1-0 | 1 | | | | 1.12 |
| 46 | | 4 | 6 | 4-0 | 1 | | | | 1.67 |
| 47 | ANTI-SLEEP COLLAR (C) | 10 | 4 | 11-9 | 1 | | | | 3.20 |
| 48 | | 10 | 4 | 1-6 | 1 | | | | 1.76 |
| 49 | | 42 | 4 | 0-6 | 1 | | | | 3.22 |
| 50 | | 10 | 4 | 1-6 | 1 | | | | 1.66 |
| 51 | | 14 | 4 | 3-5 | 1 | | | | 4.87 |
| 52 | | 14 | 4 | 4-0 | 1 | | | | 6.62 |
| 53 | | 28 | 4 | 5-6 | 1 | | | | 15.47 |
| 54 | CRADLE | 223 | 4 | 7-0 | 2 | 1-9 | 3-6 | 1-9 | 276.12 |
| 55 | | 16 | 4 | 15-6 | 1 | | | | 11.70 |
| 56 | | 4 | 4 | 9-6 | 1 | | | | 3.67 |
| 57 | | 4 | 4 | 8-6 | 1 | | | | 3.44 |
| 58 | BENT | 12 | 4 | 7-6 | 1 | | | | 10.87 |
| 59 | | 6 | 4 | 1-3 | 1 | | | | 4.57 |
| 60 | | 6 | 4 | 6-3 | 1 | | | | 8.07 |
| 61 | | 4 | 4 | 6-6 | 1 | | | | 8.67 |

STEEL

#4 BARS 8089.5 LIN. FT. 3593.0 LBS.

#5 BARS 2248.0 LIN. FT. 1346.0 LBS.

#6 BARS 3525.6 LIN. FT. 2804.0 LBS. 12610.0

8355.6 TOTAL 18288.0

CONCRETE

CLASS 'B' TYPE I 77.9 CU. YDS.

CLASS 'B' TYPE II 31.0 CU. YDS.

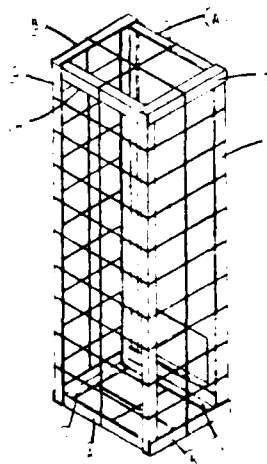
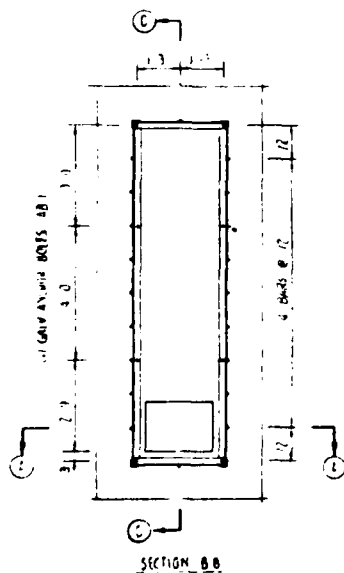
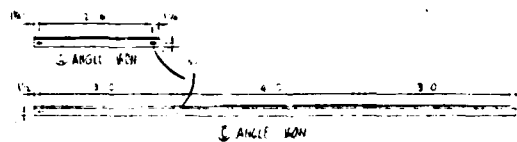
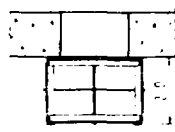
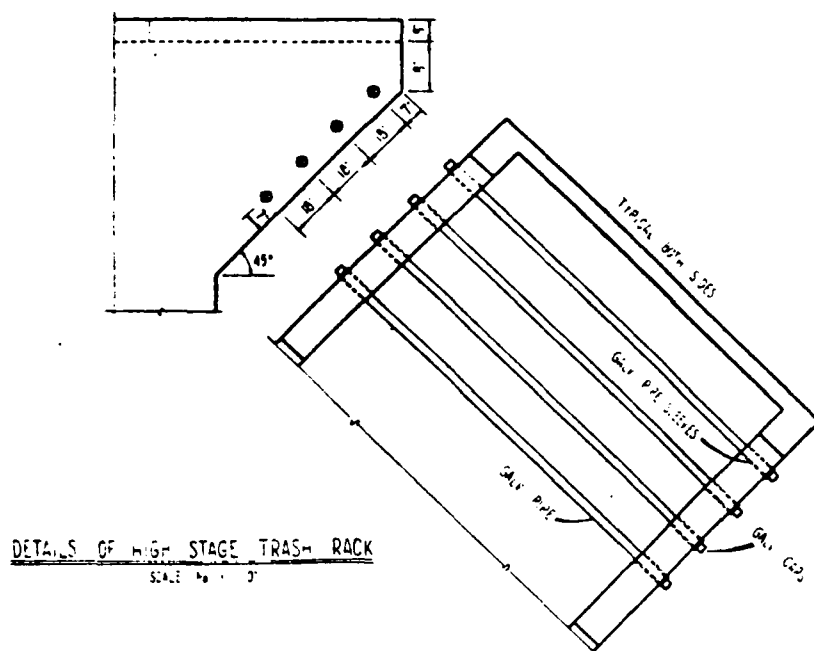
AS BUILT

ISCHUA CREEK WATERSHED PROJECT
FLOODWATER RETARDING DAM NO 5
GATES CREEK
FRANKLINVILLE, NEW YORK
CRADLE, COLLAR & BENT DETAIL

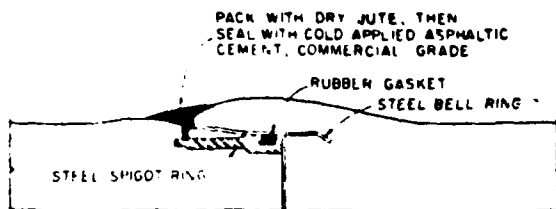
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

| | | |
|--------------------------|------------------|-------------------------|
| Designed H. L. WALL | Date Apr. '61 | Reviewed by F.H.S. |
| Drawn L. E. BOCK | APR '61 | File |
| Checked B. J. BEPMANN | APR '61 | Sheet No. 8 of 10 |

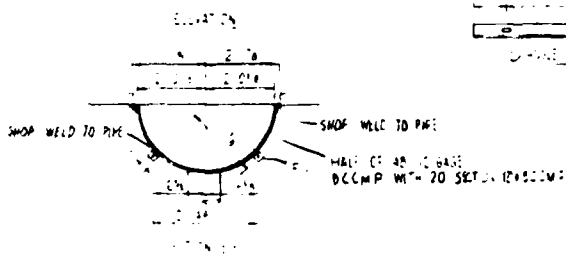
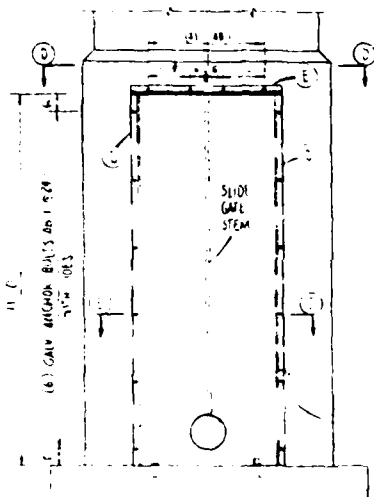
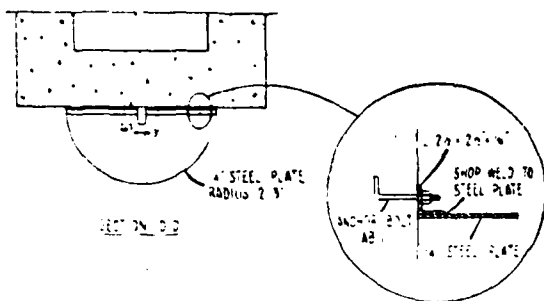
Drawing No. **NY-805**



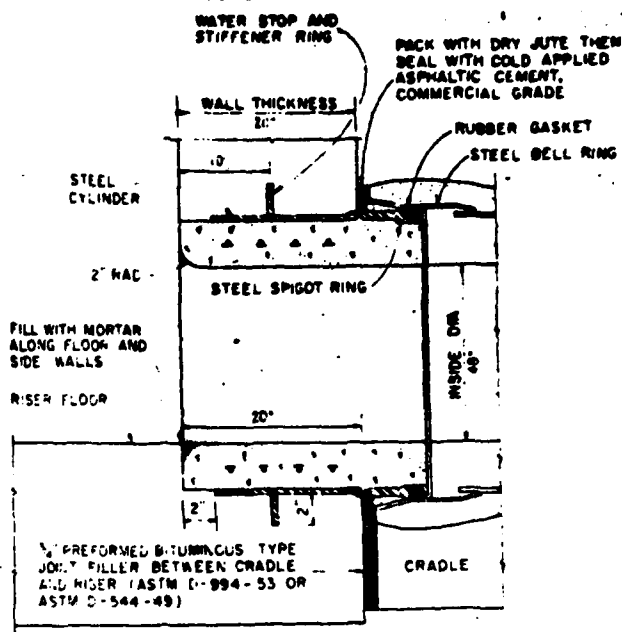
DETAILS OF GATE WE



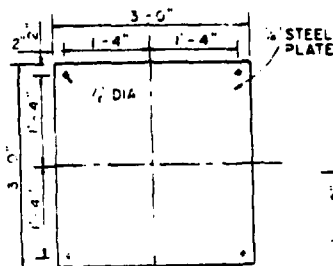
DETAIL OF REINFORCED CONCRETE WATER PIPE JOINT



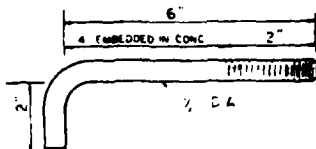
DETAILS OF GATE WELL



DETAIL OF WALL PIECE IN RISER



COVER PLATE



GALV. ANCHOR BOLT, AB-1

MANHOLE ASSEMBLY

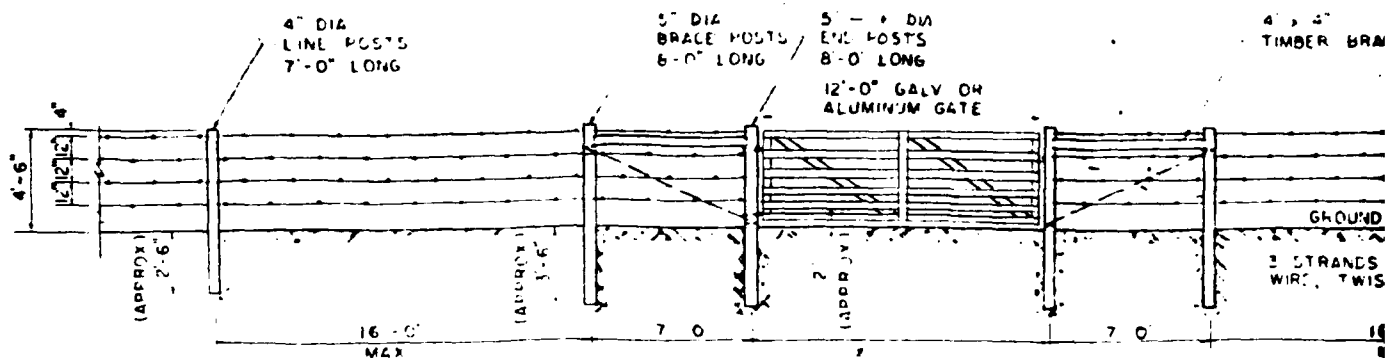
AS BUILT

| BILL OF MATERIAL | | | |
|------------------|-------------------------------|------|----------|
| ITEM NO. | DESCRIPTION | SIZE | QUANTITY |
| 1 | STEEL SPIGOT RING | 24" | 1 |
| 2 | STEEL BELL RING | 24" | 1 |
| 3 | RUBBER GASKET | 24" | 1 |
| 4 | DRY JUTE | 24" | 1 |
| 5 | COLD APPLIED ASPHALTIC CEMENT | 24" | 1 |
| 6 | STEEL CYLINDER | 24" | 1 |
| 7 | 2" RAC | 24" | 1 |
| 8 | STEEL SPIGOT RING | 24" | 1 |
| 9 | RUBBER GASKET | 24" | 1 |
| 10 | STEEL BELL RING | 24" | 1 |
| 11 | DRY JUTE | 24" | 1 |
| 12 | COLD APPLIED ASPHALTIC CEMENT | 24" | 1 |
| 13 | STEEL CYLINDER | 24" | 1 |
| 14 | 2" RAC | 24" | 1 |
| 15 | STEEL SPIGOT RING | 24" | 1 |
| 16 | RUBBER GASKET | 24" | 1 |
| 17 | STEEL BELL RING | 24" | 1 |
| 18 | DRY JUTE | 24" | 1 |
| 19 | COLD APPLIED ASPHALTIC CEMENT | 24" | 1 |
| 20 | STEEL CYLINDER | 24" | 1 |
| 21 | 2" RAC | 24" | 1 |
| 22 | STEEL SPIGOT RING | 24" | 1 |
| 23 | RUBBER GASKET | 24" | 1 |
| 24 | STEEL BELL RING | 24" | 1 |
| 25 | DRY JUTE | 24" | 1 |
| 26 | COLD APPLIED ASPHALTIC CEMENT | 24" | 1 |
| 27 | STEEL CYLINDER | 24" | 1 |
| 28 | 2" RAC | 24" | 1 |
| 29 | STEEL SPIGOT RING | 24" | 1 |
| 30 | RUBBER GASKET | 24" | 1 |
| 31 | STEEL BELL RING | 24" | 1 |
| 32 | DRY JUTE | 24" | 1 |
| 33 | COLD APPLIED ASPHALTIC CEMENT | 24" | 1 |
| 34 | STEEL CYLINDER | 24" | 1 |
| 35 | 2" RAC | 24" | 1 |
| 36 | STEEL SPIGOT RING | 24" | 1 |
| 37 | RUBBER GASKET | 24" | 1 |
| 38 | STEEL BELL RING | 24" | 1 |
| 39 | DRY JUTE | 24" | 1 |
| 40 | COLD APPLIED ASPHALTIC CEMENT | 24" | 1 |
| 41 | STEEL CYLINDER | 24" | 1 |
| 42 | 2" RAC | 24" | 1 |
| 43 | STEEL SPIGOT RING | 24" | 1 |
| 44 | RUBBER GASKET | 24" | 1 |
| 45 | STEEL BELL RING | 24" | 1 |
| 46 | DRY JUTE | 24" | 1 |
| 47 | COLD APPLIED ASPHALTIC CEMENT | 24" | 1 |
| 48 | STEEL CYLINDER | 24" | 1 |
| 49 | 2" RAC | 24" | 1 |
| 50 | STEEL SPIGOT RING | 24" | 1 |
| 51 | RUBBER GASKET | 24" | 1 |
| 52 | STEEL BELL RING | 24" | 1 |
| 53 | DRY JUTE | 24" | 1 |
| 54 | COLD APPLIED ASPHALTIC CEMENT | 24" | 1 |
| 55 | STEEL CYLINDER | 24" | 1 |
| 56 | 2" RAC | 24" | 1 |
| 57 | STEEL SPIGOT RING | 24" | 1 |
| 58 | RUBBER GASKET | 24" | 1 |
| 59 | STEEL BELL RING | 24" | 1 |
| 60 | DRY JUTE | 24" | 1 |
| 61 | COLD APPLIED ASPHALTIC CEMENT | 24" | 1 |
| 62 | STEEL CYLINDER | 24" | 1 |
| 63 | 2" RAC | 24" | 1 |
| 64 | STEEL SPIGOT RING | 24" | 1 |
| 65 | RUBBER GASKET | 24" | 1 |
| 66 | STEEL BELL RING | 24" | 1 |
| 67 | DRY JUTE | 24" | 1 |
| 68 | COLD APPLIED ASPHALTIC CEMENT | 24" | 1 |
| 69 | STEEL CYLINDER | 24" | 1 |
| 70 | 2" RAC | 24" | 1 |
| 71 | STEEL SPIGOT RING | 24" | 1 |
| 72 | RUBBER GASKET | 24" | 1 |
| 73 | STEEL BELL RING | 24" | 1 |
| 74 | DRY JUTE | 24" | 1 |
| 75 | COLD APPLIED ASPHALTIC CEMENT | 24" | 1 |
| 76 | STEEL CYLINDER | 24" | 1 |
| 77 | 2" RAC | 24" | 1 |
| 78 | STEEL SPIGOT RING | 24" | 1 |
| 79 | RUBBER GASKET | 24" | 1 |
| 80 | STEEL BELL RING | 24" | 1 |
| 81 | DRY JUTE | 24" | 1 |
| 82 | COLD APPLIED ASPHALTIC CEMENT | 24" | 1 |
| 83 | STEEL CYLINDER | 24" | 1 |
| 84 | 2" RAC | 24" | 1 |
| 85 | STEEL SPIGOT RING | 24" | 1 |
| 86 | RUBBER GASKET | 24" | 1 |
| 87 | STEEL BELL RING | 24" | 1 |
| 88 | DRY JUTE | 24" | 1 |
| 89 | COLD APPLIED ASPHALTIC CEMENT | 24" | 1 |
| 90 | STEEL CYLINDER | 24" | 1 |
| 91 | 2" RAC | 24" | 1 |
| 92 | STEEL SPIGOT RING | 24" | 1 |
| 93 | RUBBER GASKET | 24" | 1 |
| 94 | STEEL BELL RING | 24" | 1 |
| 95 | DRY JUTE | 24" | 1 |
| 96 | COLD APPLIED ASPHALTIC CEMENT | 24" | 1 |
| 97 | STEEL CYLINDER | 24" | 1 |
| 98 | 2" RAC | 24" | 1 |
| 99 | STEEL SPIGOT RING | 24" | 1 |
| 100 | RUBBER GASKET | 24" | 1 |

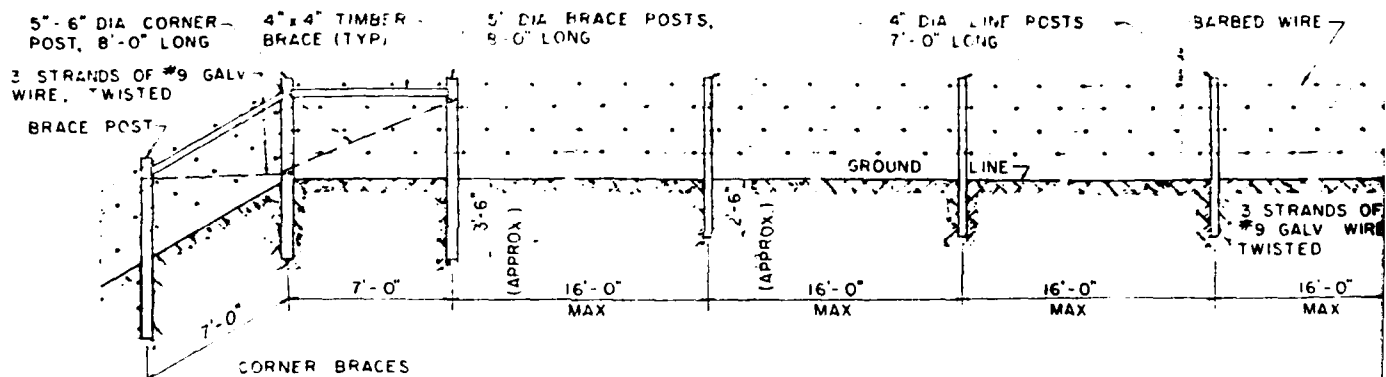
ISCHUA CREEK WATERSHED PROJECT
FLOODWATER RETARDING DAM NO 5
GATES CREEK
FRANKLINVILLE, NEW YORK
GATE WELL, TRASH RACKS & MISC. DETAILS
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

10" HOURS 1000
 10" HOURS 1000
 10" HOURS 1000

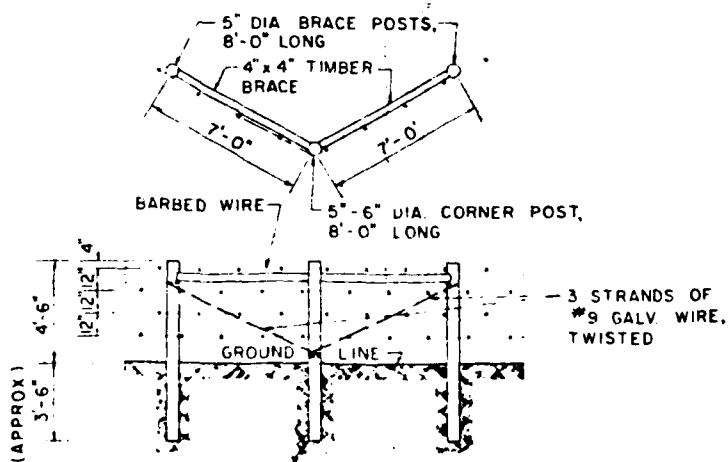
NY-805-P
 B-10



TYPICAL GATE SECTION



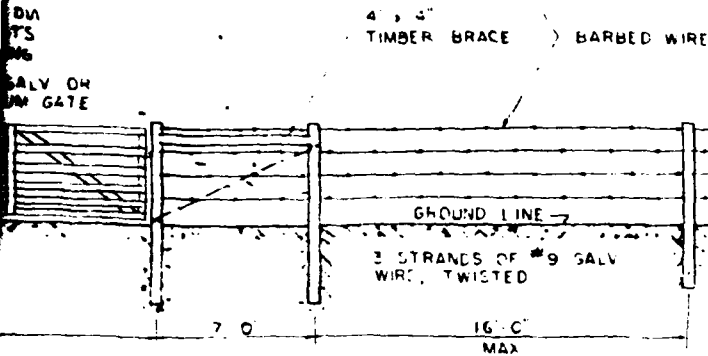
DETAIL OF 4-STRAND BARBED WIRE FENCE



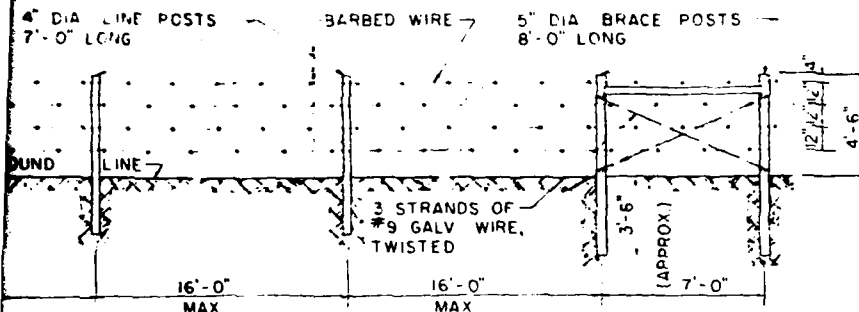
TYPICAL CORNER AND DIRECTION CHANGE BRACING

NOTES

- 1 ALL POSTS AND BRACES PRESSURE TREATED WITH CREOSOTE
- 2 BRACE POSTS, MAXIMUM SPACING 7'-0" CENTER TO CENTER
- 3 LINE POSTS, MAXIMUM SPACING 16'-0" CENTER TO CENTER
- 4 STEEL POSTS MAY BE SUBSTITUTED FOR LINE POSTS.
- 5 NOTCH POSTS $\frac{3}{4}$ INCH FOR TIMBER BRACE



GATE SECTION



LINE BRACES

BARBED WIRE FENCE

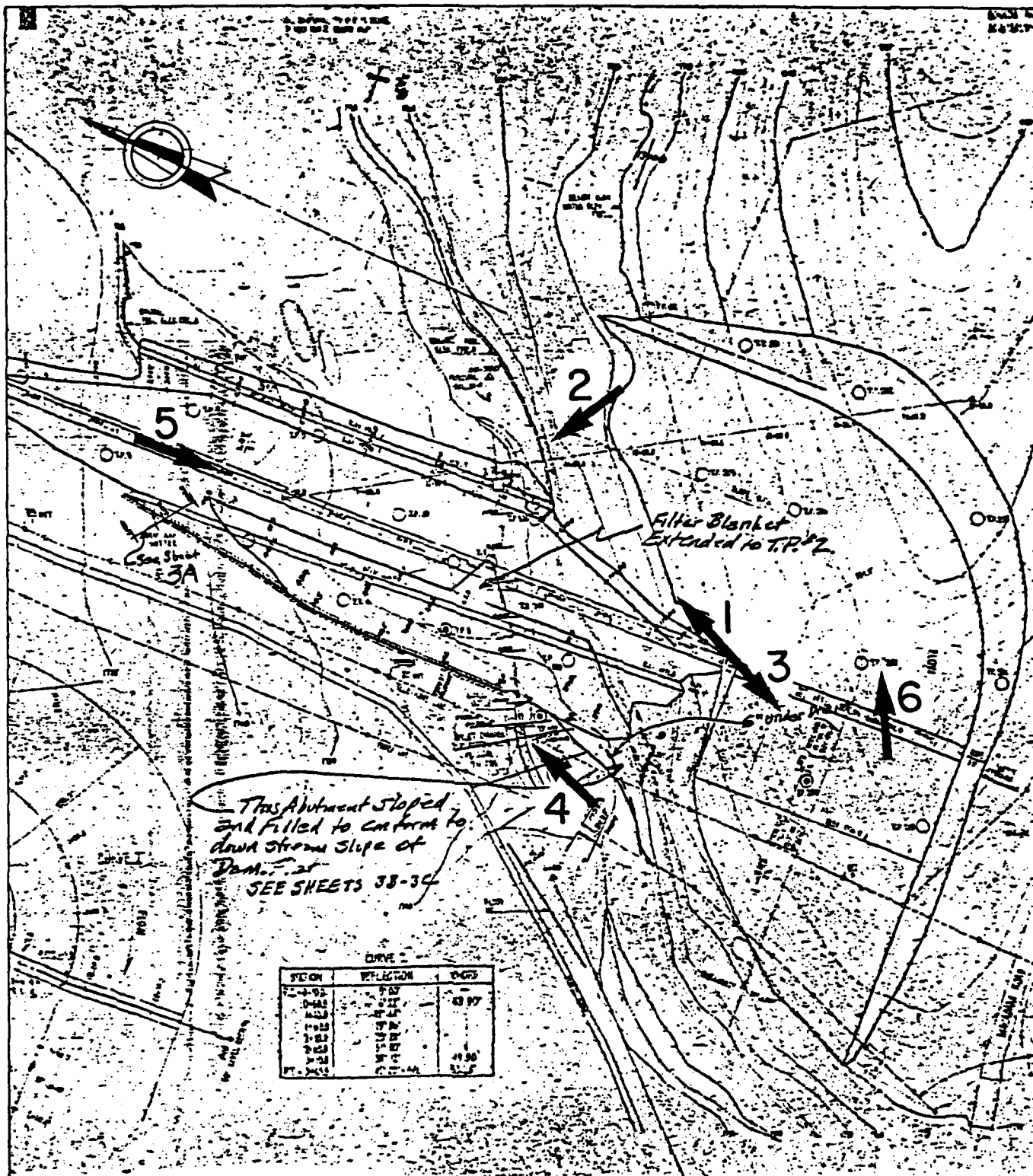
AS BUILT

| | | | |
|---------------------------------|---------|-------------|-------------|
| FENCE DETAILS | | | |
| ISCHUA CREEK WATERSHED PROJECT | | | |
| FLOODWATER RETARDING DAM NO 5 | | | |
| GATES CREEK | | | |
| FRANKLINVILLE, NEW YORK | | | |
| U. S. DEPARTMENT OF AGRICULTURE | | | |
| SOIL CONSERVATION SERVICE | | | |
| Drawn by | Date | Approved by | Title |
| Wm. A. ALLABAND | | | |
| CHAS. B. FORD | 5-31-60 | | |
| Checked by | | Sheet | Project No. |
| NORMAN W. WILSON | 5-12-60 | No. 10 | NY - 805 - |

B-11

APPENDIX C

PHOTOGRAPHS



ISCHUA CREEK WATERSHED DAM #5

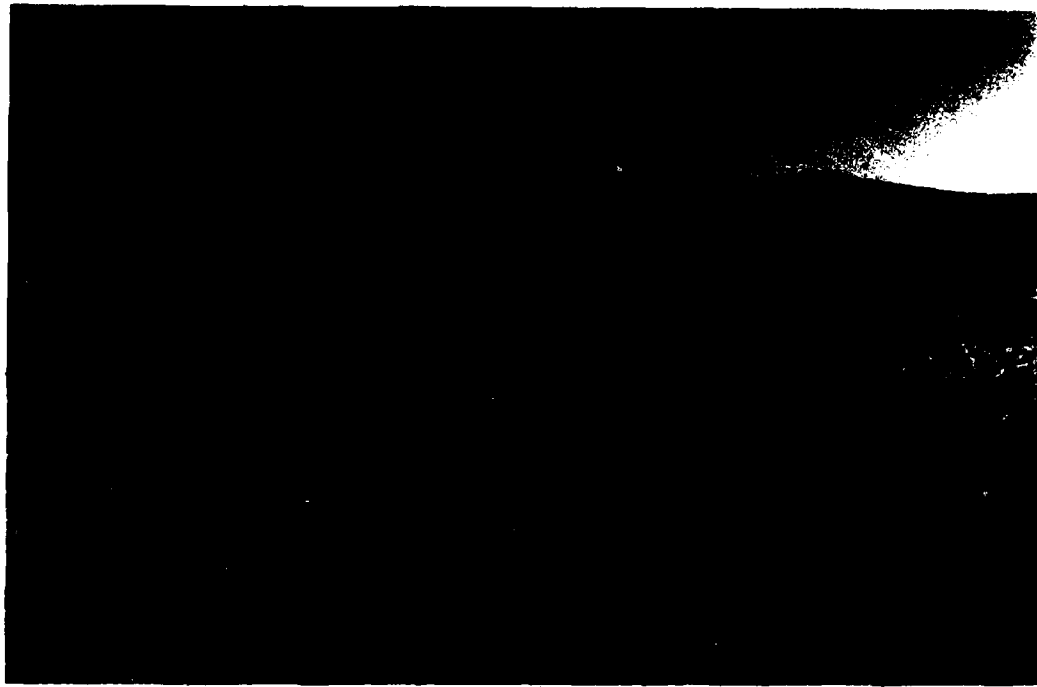
NY00565

PHOTO ORIENTATION PLAN

ERDMAN, ANTHONY, ASSOCIATES
CONSULTING ENGINEERS & PLANNERS

DATE
MAY 1981

C-1



1. Principal spillway inlet structure and impoundment



2. Principal spillway inlet structure and upstream face of dam



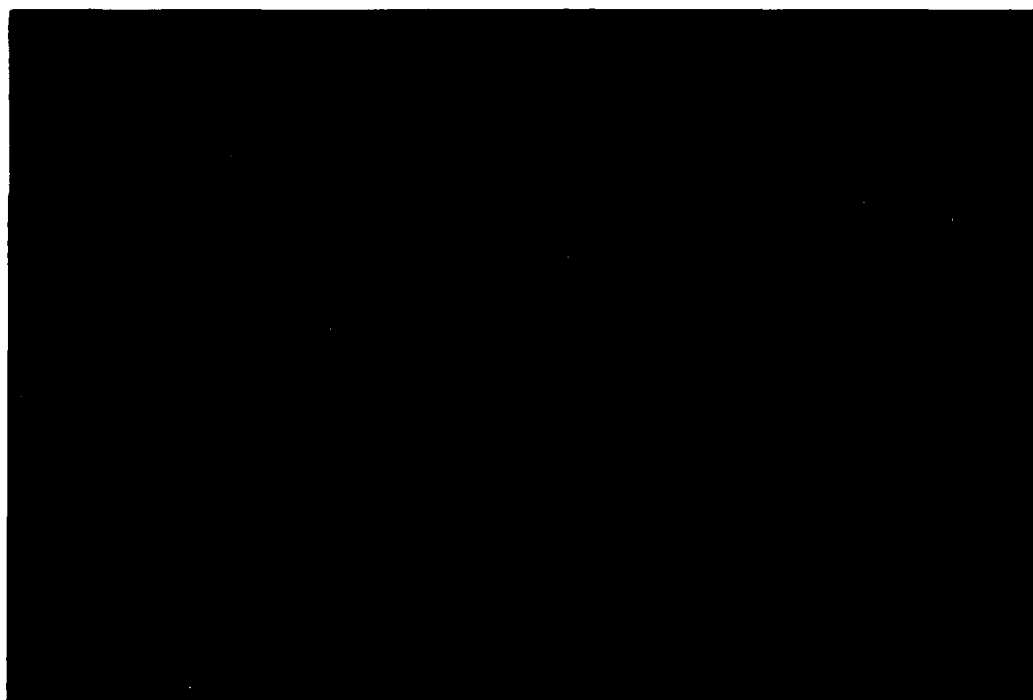
3. Emergency spillway



4. Principal spillway outlet pipe and plunge pool



5. Crest of dam



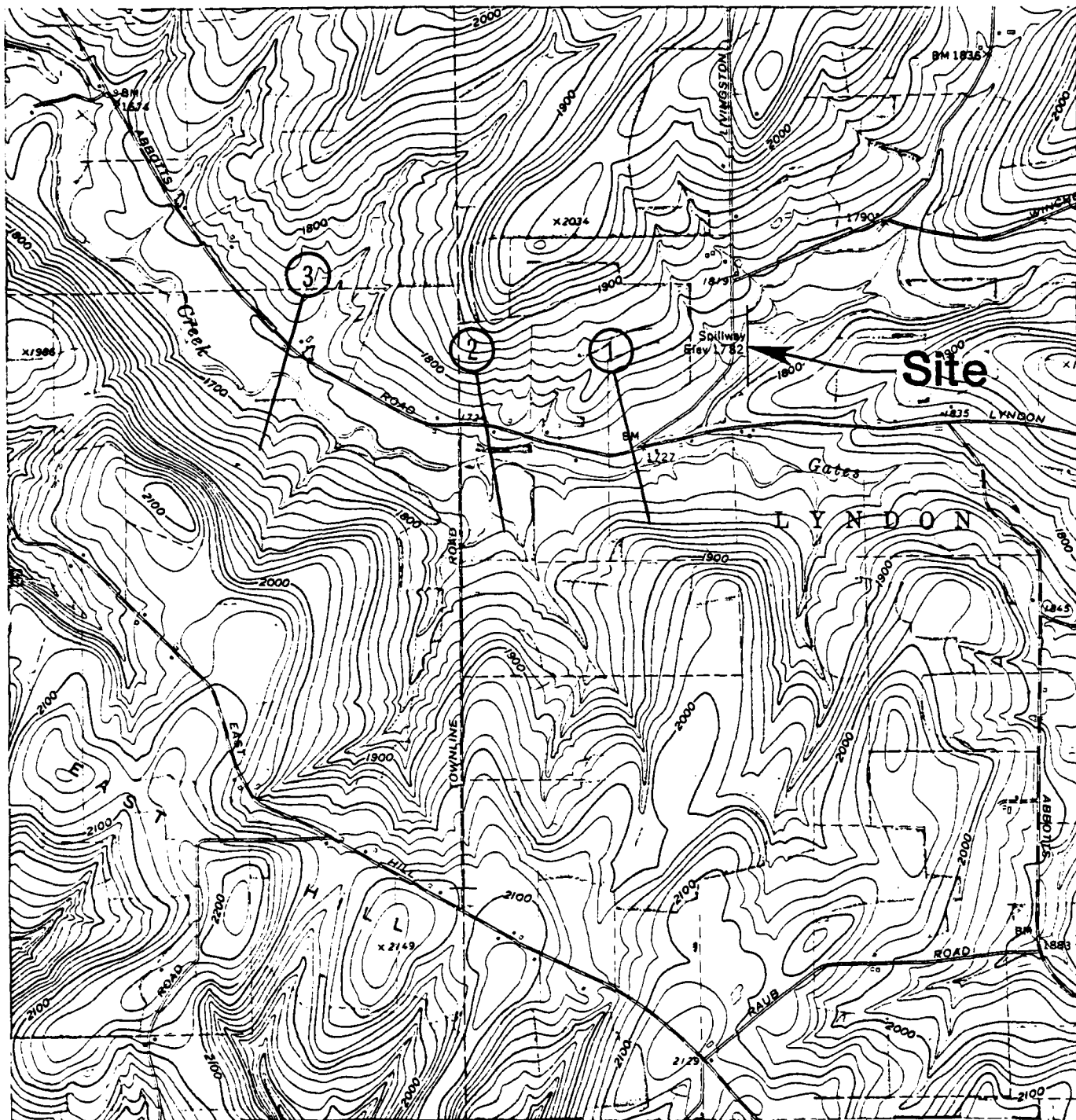
6. Emergency spillway

APPENDIX D

HYDRAULIC AND HYDROLOGIC COMPUTATIONS

APPENDIX D

| | <u>PAGE</u> |
|--|-------------|
| Cross Section Location Plan | D-2 |
| HEC-1 Dam Safety Version Computer Program - Input | D-3 |
| HEC-1 Dam Safety Version Computer Program - Output | D-5 |
| Supporting Calculations | |
| • Hydrology | D-14 |
| • Spillway Hydraulics | D-19 |
| • Downstream Channel Routing | D-29 |



**Ischua Creek Watershed
Dam No. 5**

CROSS SECTION LOCATION PLAN

Scale: 1"=2000'

PAGE 0002

| K1 | CHANNEL ROUTING | -MOL | PULS | RFACH | 2-3 |
|----|-----------------|------|------|-------|------|
| V | 1 | | | | |
| V1 | 1 | | | | |
| V6 | .04 | .04 | 1683 | 1720 | 3600 |
| V7 | 0 | 100 | 1733 | 655 | 1688 |
| V7 | 755 | 1050 | 1700 | 1500 | 1720 |
| K | 95 | | | | |

OF SEG #HEC108

OK, SEG #HEC108
ENTER PROJECT NUMBER
80166-00.04
INPUT FILE ? NY565
1
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION JULY 1978
LAST MODIFICATION 26 FEB 79

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS
1
RUNOFF HYDROGRAPH AT INFLOW
ROUTE HYDROGRAPH TO UTFLOW
ROUTE HYDROGRAPH TO A
RUNOFF HYDROGRAPH AT GATES
COMBINE 2 HYDROGRAPHS AT 1
ROUTE HYDROGRAPH TO 2
ROUTE HYDROGRAPH TO 3
END OF NETWORK

1
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION JULY 1978
LAST MODIFICATION 26 FEB 79

RUN DATE: 4/30/
TIME: 8:01 AM

ANALYSIS OF DAM OVERTOPPING USING RATIOS OF PMF
HYDROLOGIC-HYDRAULIC ANALYSIS OF SAFETY OF ISCHUA CREEK DAM NO. 5
RATIOS OF PMF ROUTED THROUGH THE RESERVOIR AND DOWNSTREAM

| JOB SPECIFICATION | | | | | | | | | |
|-------------------|-----|------|-------|-------|------|-------|------|------|-------|
| NO | NHR | HMIN | IDAY | THR | IMIN | MEIRC | IPLT | IFRT | ASTAN |
| 100 | 0 | 15 | 0 | 0 | 0 | 0 | -1 | 4 | 0 |
| JOPER | | NWT | LROPT | TRACE | | | | | |
| | | 5 | 0 | 0 | 0 | | | | |

MULTI-PLAN ANALYSES TO BE PERFORMED
RTIOS= 0.20 0.40 0.50 0.60 0.80 1.00
NPLAN= 1 NRTIC= 6 LRTIO= 1

SUF-AREA RUNOFF COMPUTATION

CALCULATION OF INFLOW HYDROGRAPH TO RESERVOIR
ISTAR ICOMP IECON ITAPE JPLT JPRT INAF ISTAGE IAUTO
INFLOW 0 0 0 0 0 0 0 0 0 0
HYDROGRAPH DATA
THYOC THUG TARA SHAP TRSDA TRSEC RATIO ISNOV ISAPE LOCAL

OK, SEE INJECTION

PAGE 0002

| 1 | 1 | 6.40 | 0.00 | 13.04 | 0.00 | 0.000 | 0 | 1 | 0 |
|-------------|-------|--------|--------|--------|--------|-------|------|---|---|
| PRECIP DATA | | | | | | | | | |
| SPFE | PMS | R6 | R12 | R24 | R48 | R72 | R96 | | |
| 0.00 | 22.50 | 117.00 | 127.00 | 141.00 | 151.00 | 0.00 | 0.00 | | |

TRSPC COMPUTED BY THE PROGRAM IS 0.809

| LROPT | STRKR | DLTKR | RTIOL | ERAIN | STRKS | RTIOK | STIKL | CKSTL | ALSMX | RTIMP |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 1.00 | 1.00 | 0.10 | 0.00 | 0.00 |

UNIT HYDROGRAPH DATA
 TP= 3.49 CP=0.63 NTA= 0

RECESSION DATA
 STRTQ= 2.00 QRCSE= -0.10 RTIOR= 2.00

UNIT HYDROGRAPH 77 END-OF-PERIOD ORDINATES, LAG= 3.52 HOURS, CP= 0.64 VOL= 1.00

| | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|
| 14. | 54. | 111. | 177. | 259. | 328. | 409. | 492. | 571. | 638. |
| 691. | 730. | 756. | 766. | 760. | 729. | 678. | 627. | 580. | 527. |
| 476. | 459. | 425. | 393. | 363. | 336. | 311. | 288. | 266. | 246. |
| 228. | 210. | 195. | 180. | 167. | 154. | 142. | 132. | 122. | 113. |
| 104. | 96. | 89. | 82. | 76. | 71. | 65. | 60. | 56. | 52. |
| 48. | 44. | 41. | 38. | 35. | 32. | 30. | 28. | 26. | 24. |
| 22. | 20. | 19. | 17. | 16. | 15. | 14. | 13. | 12. | 11. |
| 10. | 9. | 9. | 8. | 7. | 7. | 6. | | | |

| MO. DA | HR. MN | PERIOD | RAIN | EXCS | LOSS | COMP Q | MO. DA | HR. MN | PERIOD | RAIN | EXCS | LOSS | CCMF Q |
|--------|--------|--------|----------|----------|---------|--------|--------|--------|--------|------|------|------|-------------|
| 0 | | | | | | | | | | | | | |
| SUM | | | 27.49 | 23.74 | 3.75 | | | | | | | | 336826. |
| | | | (658.) | (603.) | (95.) | | | | | | | | (9537.84) |

HYDROGRAPH ROUTING

CALCULATION OF OUTFLOW HYDROGRAPH FROM RESERVOIR

| STAGE | 1772.70 | 1775.90 | 1778.90 | 1780.00 | 1781.00 | 1782.00 | 1783.90 | 1784.00 | 1785.00 | 1786.00 |
|-----------|----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| FLOW | 12067.00 | 145.00 | 276.00 | 305.00 | 312.00 | 328.00 | 343.00 | 3455.00 | 6104.00 | 9705.00 |
| CAPACITY= | 0. | 45. | 470. | 476. | 1410. | 1416. | 1716. | | | |

OK, SEE SHEET 10

PAGE 0003

ELEVATION= 1739. 1752. 1772. 1781. 1787. 1789. 1790.
CREL SPWD COOW FXFW ELVL COOL CAREA EXFL
1782.0 0.0 0.0 0.0 0.0 0.0 0.0

OAM DATA
TOPEL COOD EXPD DAMWID
1789.2 2.7 1.5 1300.

PEAK OUTFLOW IS 1851. AT TIME 45.00 HOURS
PEAK OUTFLOW IS 4953. AT TIME 43.50 HOURS
PEAK OUTFLOW IS 6228. AT TIME 43.25 HOURS
PEAK OUTFLOW IS 7494. AT TIME 43.25 HOURS
PEAK OUTFLOW IS 10015. AT TIME 43.25 HOURS
PEAK OUTFLOW IS 12515. AT TIME 43.25 HOURS

HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD PULS RESERVOIR -A
1STAQ ICOPP IECON ITAPE JPLT JPRT INAPE ISTAGE IAUO
A 0 0 0 0 0 0 0
ROUTING DATA
QLOSS CROSS AVG IPRES ISAME IOPT JPMP LSTR
0.0 0.000 0.00 1 1 0 0 0
NSTPS NSTDL LAG APSKK X TSK STORA ISPRAT
1 0 0 0.000 0.000 0.000 0.000 0

NORMAL DEPTH CHANNEL ROUTING

GN(1) GN(2) GN(3) ELNVT ELMAX RLNTH SEL
0.0830 0.0400 0.0400 1719.0 1780.0 1900. 0.00810

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
0.00 1783.00 150.00 1760.00 660.00 1725.00
690.00 1725.00 1790.00 1760.00 2900.00 1780.00

STORAGE 0.00 2.66 6.62 23.87 61.80 120.41 295.68 421.33 561.67
723.68 906.78 1109.75 1233.47 1569.03 1812.68 2064.42 2324.25 2592.17 2861.10
OUTFLOW 0.00 369.32 1315.91 4302.67 12168.47 27222.55 51410.70 84479.17 124035.50 156000.78
272601.44 366403.44 474321.88 614321.88 78555.38 975625.88 1184383.00 1411754.75 1657747.50 1912381.75
STAGE 1719.00 1722.01 1725.42 1728.63 1731.84 1735.05 1738.26 1741.47 1744.68 1747.89

OK, SEG WHECIBR

PAGE 0004

| | | | | | | | | | |
|------------------|-----------|-----------|-----------|-----------|-----------|------------|------------|------------|------------|
| 1751.10 | 1754.31 | 1757.53 | 1760.74 | 1763.95 | 1767.16 | 1770.37 | 1773.58 | 1776.79 | 1780.00 |
| 0.00 | 368.32 | 1315.91 | 4302.67 | 12168.47 | 27222.55 | 51410.70 | 86479.17 | 124039.50 | 159607.78 |
| 272601.44 | 364803.44 | 478322.13 | 614321.88 | 785555.38 | 975625.88 | 1184383.00 | 1411758.75 | 1657746.50 | 1912381.75 |
| MAXIMUM STAGE IS | 1726.0 | | | | | | | | |
| MAXIMUM STAGE IS | 1728.9 | | | | | | | | |
| MAXIMUM STAGE IS | 1729.4 | | | | | | | | |
| MAXIMUM STAGE IS | 1729.9 | | | | | | | | |
| MAXIMUM STAGE IS | 1731.0 | | | | | | | | |
| MAXIMUM STAGE IS | 1731.9 | | | | | | | | |

SUB-AREA RUNOFF COMPUTATION

COMPUTE GATES CREEK HYDROGRAPH

| | | | | | | | | |
|-------|-------|-------|-------|------|------|-------|--------|-------|
| ISTAG | ICOMP | IECON | ITAPE | JPLI | JPRI | INAME | ISTAGE | IAUTO |
| GATES | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |

| | | | | | | | | | |
|-------|------|-------|------|-------|-------|-------|-------|-------|-------|
| INVDG | IUNG | TAREA | SNAP | TRSDA | TRSPC | RATIO | ISNOW | ISAME | LOCAL |
| 1 | 1 | 6.64 | 0.00 | 13.04 | 0.00 | 0.000 | 0 | 1 | 0 |

PRECIP DATA

| | | | | | | | |
|------|-------|--------|--------|--------|--------|------|------|
| SPFE | PMS | R6 | R12 | R24 | R48 | R72 | R96 |
| 0.00 | 22.50 | 114.00 | 124.00 | 138.00 | 148.00 | 0.00 | 0.00 |

TRSPC COMPUTED BY THE PROGRAM IS 0.003

LOSS DATA

| | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| LADPT | STARR | DLTKR | RTIOL | ERAIN | STRKS | RTIOK | STATL | CNSTL | ALSNX | RTIMP |
| 0 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 1.00 | 1.00 | 0.10 | 0.00 | 0.00 |

UNIT HYDROGRAPH DATA
TF= 4.11 CP=0.63 NTA= 0

RECESSION DATA

SIRTO= 2.00 GRCSN= -0.10 RTIOR= 2.00

| | | | | |
|--|------|-------|----------|-----------|
| UNIT HYDROGRAPH 98 END-OF-PERIOD ORDINATES, LAGE | 4.10 | HOLRS | CP= 0.63 | VOL= 1.00 |
| 10. | 38. | 79. | 17. | 236. |
| 539. | 585. | 422. | 650. | 678. |
| 549. | 514. | 481. | 451. | 422. |
| 284. | 266. | 249. | 233. | 218. |
| 147. | 138. | 129. | 121. | 113. |
| 76. | 71. | 67. | 62. | 58. |
| 29. | 27. | 34. | 32. | 30. |
| 20. | 19. | 18. | 17. | 16. |
| 11. | 10. | 9. | 8. | 7. |
| 484. | 571. | 703. | 157. | 81. |
| 422. | 626. | 324. | 168. | 87. |
| 45. | 48. | 25. | 13. | 7. |
| 12. | 11. | 6. | | |

OK, SEE #HEC10H

PAGE 0005

| MO.DA | HR.MN | PERIOD | RAIN | EXCS | LOSS | END-OF-PERIOD FLOW | COMP 0 | MO.DA | HR.MN | PERIOD | RAIN | EXCS | LOSS | CONF 0 |
|-------|----------|----------|---------|------------|------|--------------------|--------|-------|-------|--------|------|------|------|--------|
| 0 | | | | | | | | | | | | | | |
| SUM | 25.94 | 23.19 | 3.76 | 318474 | | | | | | | | | | |
| | (684.1) | (589.1) | (95.1) | (9018.17) | | | | | | | | | | |

COMBINE HYDROGRAPHS

COMBINE OUTFLOW FROM DAM 565 WITH RUNOFF FROM GATES CREEK

| ISTAG | ICOMP | IECON | ITAPE | JPLI | JPRY | INAME | ISTAGE | IAUTO |
|-------|-------|-------|-------|------|------|-------|--------|-------|
| 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

HYDROGRAPH ROUTING

CHANNEL ROUTING - MOD PULS A-1

| QLOSS | CLOSS | AVG | IRES | ISAME | IOFT | IPRP | LSTR |
|-------|-------|------|------|-------|------|------|------|
| 0.0 | 0.000 | 0.00 | 1 | 1 | 0 | 0 | 0 |

| NSTPS | NSTDL | LAG | APSKK | X | TSK | STORA | ISPRAY |
|-------|-------|-----|-------|-------|-------|-------|--------|
| 1 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0. | 0 |

NORMAL DEPTH CHANNEL ROUTING

| ON(1) | ON(2) | ON(3) | ELNVT | ELPAY | RLNTH | SEL |
|--------|--------|--------|--------|--------|-------|---------|
| 0.0400 | 0.0400 | 0.0400 | 1719.0 | 1780.0 | 200. | 0.00810 |

CROSS SECTION COORDINATES--STA=ELEV,STA,ELEV--ETC

| STA | ELEV | STA | ELEV |
|--------|---------|---------|---------|
| 0.00 | 1780.00 | 150.00 | 1760.00 |
| 725.00 | 1724.00 | 1790.00 | 1760.00 |
| | | 2000.00 | 1780.00 |

| STORAGE | 0.00 | 0.62 | 2.17 | 5.55 | 10.96 | 18.39 | 27.05 | 39.33 | 52.03 | 64.36 |
|---------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | 85.91 | 105.49 | 127.09 | 150.68 | 175.48 | 201.13 | 227.63 | 254.98 | 282.18 | 310.23 |

| OUTFLOW | 0.00 | 704.18 | 3906.27 | 12299.80 | 28350.94 | 54277.51 | 92039.09 | 143434.03 | 210144.22 | 273761.19 |
|---------|-----------|-----------|----------|-----------|------------|------------|------------|------------|------------|------------|
| | 395803.31 | 517727.75 | 66039.75 | 831776.25 | 1042034.50 | 1274395.75 | 1528801.75 | 1805274.50 | 2103896.00 | 2414791.50 |

| STAGE | 1719.00 | 1722.21 | 1725.42 | 1728.63 | 1731.84 | 1735.05 | 1738.26 | 1741.47 | 1744.68 | 1747.89 |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| | 1751.10 | 1754.31 | 1757.53 | 1760.74 | 1763.95 | 1767.16 | 1770.37 | 1773.58 | 1776.79 | 1780.00 |

| FLOW | 0.00 | 708.18 | 3906.27 | 12299.80 | 28350.94 | 54277.51 | 92039.09 | 143434.03 | 210144.22 | 273761.19 |
|------|-----------|-----------|----------|-----------|------------|------------|------------|------------|------------|------------|
| | 195803.31 | 517727.75 | 66039.75 | 831776.25 | 1042034.50 | 1274395.75 | 1528801.75 | 1805274.50 | 2103896.00 | 2414791.50 |

OK, SEG #HLC10P

PAGE 0006

MAXIMUM STAGE IS 1725.3
 MAXIMUM STAGE IS 1727.6
 MAXIMUM STAGE IS 1728.5
 MAXIMUM STAGE IS 1729.0
 MAXIMUM STAGE IS 1730.0
 MAXIMUM STAGE IS 1730.9

HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD PULS REACH 1-2

| ISTAG | ICOMP | IECON | ITAPE | JPLI | JPRI | INAP | ISTAGE | IAUTO |
|--|-------|-------|-------|-------|-------|-------|--------|-------|
| 2 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| ROUTING DATA | | | | | | | | |
| QLOSS | CLOSS | AVG | IRIS | ISAME | IOFI | IPMP | LSTR | |
| 0.0 | 0.000 | 0.00 | 1 | 1 | 0 | 0 | 0 | |
| NSTPS NSTDL LAG AMSKK X TSK STORA ISPRAT | | | | | | | | |
| 1 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0 | 0 |

NORMAL DEPTH CHANNEL ROUTING

| GN(1) | GN(2) | GN(3) | ELNVT | ELMAY | RLNTH | SEL |
|--------|--------|--------|--------|--------|-------|---------|
| 0.0400 | 0.0400 | 0.0400 | 1705.0 | 1730.0 | 2100. | 0.00660 |

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

| | | | | | | | | | |
|--------|---------|--------|---------|---------|---------|--------|---------|--------|---------|
| 0.00 | 1730.00 | 675.00 | 1720.00 | 800.00 | 1710.00 | 842.50 | 1705.00 | 857.50 | 1705.00 |
| 900.00 | 1710.00 | 960.00 | 1720.00 | 1100.00 | 1730.00 | | | | |

| | | | | | | | | | | |
|---------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|
| STORAGE | 0.00 | 1.66 | 4.74 | 9.24 | 15.16 | 22.58 | 31.55 | 42.06 | 54.11 | 67.71 |
| | 82.85 | 99.54 | 118.71 | 144.26 | 176.62 | 215.77 | 261.72 | 314.48 | 374.04 | 441.40 |
| OUTFLOW | 0.00 | 98.48 | 413.39 | 1016.57 | 2027.67 | 3693.03 | 5692.48 | 8689.06 | 12135.40 | 16296.92 |
| | 21212.74 | 26936.18 | 32440.34 | 39264.75 | 46181.96 | 59309.91 | 72866.63 | 89090.02 | 108218.31 | 130484.39 |
| STAGE | 1705.00 | 1706.32 | 1707.63 | 1708.95 | 1710.26 | 1711.58 | 1712.89 | 1714.21 | 1715.53 | 1716.84 |
| | 1718.16 | 1719.47 | 1720.79 | 1722.10 | 1723.42 | 1724.74 | 1726.05 | 1727.37 | 1728.68 | 1730.00 |
| FLOW | 0.00 | 98.48 | 413.39 | 1016.57 | 2027.67 | 3693.03 | 5692.48 | 8689.06 | 12135.40 | 16296.92 |
| | 21212.74 | 26936.18 | 32440.34 | 39264.75 | 46181.96 | 59309.91 | 72866.63 | 89090.02 | 108218.31 | 130484.39 |

MAXIMUM STAGE IS 1711.6
 MAXIMUM STAGE IS 1714.5

MAXIMUM STAGE IS 1715.4
 MAXIMUM STAGE IS 1716.2
 MAXIMUM STAGE IS 1717.6
 MAXIMUM STAGE IS 1718.8

HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD PULS REACH 2-3

| ISTAO | ICOMP | IECON | ITAPE | JPLT | JPRY | INAPE | ISTAGE | IAUTO |
|--------------|-------|-------|-------|-------|-------|-------|--------|-------|
| 3 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| ROUTING DATA | | | | | | | | |
| QLOSS | CLOSS | AVG | IRES | ISAME | IOPT | IPMP | LSTR | |
| 0.0 | 0.000 | 0.00 | 1 | 1 | 0 | 0 | 0 | |
| NSIPS | | | | | | | | |
| 1 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0 |
| LAG | | | | | | | | |
| 1 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0 |
| AMSKK | | | | | | | | |
| 1 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0 |
| ISPRAT | | | | | | | | |
| 1 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0 |

NORMAL DEPTH CHANNEL ROUTING

| ON(1) | ON(2) | ON(3) | ELNVT | ELMAX | RLNTH | SEL |
|--------|--------|--------|--------|--------|--------|---------|
| 0.0400 | 0.0400 | 0.0400 | 1683.0 | 1720.0 | 3600.0 | 0.00610 |

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
 0.00 1720.00 100.00 1700.00 655.00 1688.00 697.50 1683.00 712.50 1683.00
 755.00 1688.00 1050.00 1700.00 1500.00 1720.00

| STORAGE | 0.00 | 5.08 | 15.48 | 32.79 | 69.58 | 128.56 | 209.75 | 313.13 | 438.70 | 581.98 |
|---------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| | 745.50 | 913.64 | 1090.39 | 1275.77 | 1469.76 | 1672.36 | 1883.59 | 2103.43 | 2331.89 | 2561.97 |
| OUTFLOW | 0.00 | 209.76 | 948.04 | 2625.51 | 6215.86 | 12640.38 | 22761.54 | 37332.99 | 57042.88 | 73351.19 |
| | 118160.75 | 158896.09 | 205586.69 | 258256.66 | 316956.88 | 381756.50 | 452737.31 | 529089.63 | 613611.88 | 713706.38 |
| STAGE | 1683.00 | 1684.95 | 1686.89 | 1688.84 | 1690.79 | 1692.74 | 1694.68 | 1696.63 | 1698.58 | 1700.53 |
| | 1702.47 | 1704.42 | 1706.37 | 1708.31 | 1710.26 | 1712.21 | 1714.16 | 1716.10 | 1718.05 | 1720.00 |
| FLOW | 0.00 | 209.76 | 948.04 | 2625.51 | 6215.86 | 12640.38 | 22761.54 | 37332.99 | 57042.88 | 73351.19 |
| | 118160.75 | 158896.09 | 205586.69 | 258256.66 | 316956.88 | 381756.50 | 452737.31 | 529089.63 | 613611.88 | 713706.38 |

MAXIMUM STAGE IS 1689.5
 MAXIMUM STAGE IS 1691.8
 MAXIMUM STAGE IS 1692.5
 MAXIMUM STAGE IS 1692.1

MAXIMUM STAGE IS 1694.0

MAXIMUM STAGE IS 1694.8

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
 FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
 AREA IN SQUARE MILES (SQUARE KILOMETERS)

| OPERATION | STATION | AREA | PLAN | RATIOS APPLIED TO FLOWS | | | | | |
|---------------|---------|-------------------|------|-------------------------|--------------------|---------------------|---------------------|---------------------|---------------------|
| | | | | RATIO 1 | RATIO 2 | RATIO 3 | RATIO 4 | RATIO 5 | RATIO 6 |
| | | | | 0.20 | 0.40 | 0.50 | 0.60 | 0.80 | 1.00 |
| HYDROGRAPH AT | INFLOW | 6.40 (16.58) | 1 | 2519. (71.34) | 5039. (142.68) | 6298. (178.35) | 7558. (214.02) | 10077. (285.36) | 12597. (356.70) |
| | | | | | | | | | |
| ROUTED TO | OUTFLOW | 6.40 (16.58) | 1 | 1851. (52.41) | 4953. (140.24) | 6228. (176.37) | 7494. (212.21) | 10015. (283.58) | 12515. (354.40) |
| | | | | | | | | | |
| ROUTED TO | A | 6.40 (16.58) | 1 | 1845. (52.26) | 4955. (140.32) | 6222. (176.19) | 7485. (211.94) | 10006. (283.32) | 12508. (354.18) |
| | | | | | | | | | |
| HYDROGRAPH AT | GATES | 6.64 (17.20) | 1 | 2285. (64.71) | 4570. (129.42) | 5713. (161.78) | 6856. (194.13) | 9141. (258.84) | 11426. (323.55) |
| | | | | | | | | | |
| 2 COMBINED | | 13.04 (33.77) | 1 | 3804. (107.72) | 9526. (269.74) | 11935. (337.96) | 14331. (405.82) | 19116. (541.31) | 23893. (676.58) |
| | | | | | | | | | |
| ROUTED TO | 1 | 13.04 (33.77) | 1 | 3803. (107.68) | 9530. (269.87) | 11935. (338.08) | 14334. (405.90) | 19118. (541.36) | 23893. (676.57) |
| | | | | | | | | | |
| ROUTED TO | 2 | 13.04 (33.77) | 1 | 3808. (107.84) | 9526. (269.75) | 11937. (338.01) | 14335. (405.93) | 19125. (541.55) | 23901. (676.81) |
| | | | | | | | | | |
| ROUTED TO | 3 | 13.04 (33.77) | 1 | 3791. (107.34) | 9503. (269.09) | 11909. (337.22) | 14319. (405.47) | 19111. (541.16) | 23895. (676.62) |
| | | | | | | | | | |

SUMMARY OF DAM SAFETY ANALYSIS

| PLAN 1 | | | | INITIAL VALUE | | SPILLWAY CREST | | TOP OF DAM | |
|------------------------------------|--|--|---|---|---|---|---|------------|--|
| | | | | ELEVATION | | | | | |
| | | | | STORAGE | | 1772.00 | | 1782.00 | |
| | | | | OUTFLOW | | 470. | | 1643. | |
| | | | | | | 64. | | 22137. | |
| FATIO OF PMF 0.20 0.42 | MAXIMUM RESERVOIR W.S.ELEV 1782.21 1784.56 | MAXIMUM DEPTH OVER DAM 0.00 0.00 | MAXIMUM STORAGE AC-FT 1117. 1217. | MAXIMUM OUTFLOW CFS 1951. 4953. | DURATION OVER TOP HOURS 0.00 0.00 | TYPE OF MAX OUTFLOW HOURS 45.00 43.59 | TIME OF FAILURE HOURS 0.00 0.00 | | |
| | | | | | | | | | |

| | | | | | | | |
|------|---------|------|-------|--------|------|-------|------|
| 0.50 | 1785.04 | 0.00 | 1252. | 6228. | 0.00 | 43.25 | 0.00 |
| 0.60 | 1785.45 | 0.00 | 1282. | 7494. | 0.00 | 43.25 | 0.00 |
| 0.80 | 1786.22 | 0.00 | 1338. | 10015. | 0.00 | 43.25 | 0.00 |
| 1.00 | 1786.92 | 0.00 | 1389. | 12515. | 0.00 | 43.25 | 0.00 |

PLAN 1 STATION A

| RATIO | MAXIMUM FLOW,CFS | MAXIMUM STAGE,FT | TIME HOURS |
|-------|---------------------|---------------------|---------------|
| 0.20 | 1845. | 1726.0 | 45.00 |
| 0.40 | 4955. | 1728.9 | 43.50 |
| 0.50 | 6222. | 1729.4 | 43.50 |
| 0.60 | 7485. | 1729.9 | 43.25 |
| 0.80 | 10006. | 1731.0 | 43.25 |
| 1.00 | 12508. | 1731.9 | 43.25 |

PLAN 1 STATION 1

| RATIO | MAXIMUM FLOW,CFS | MAXIMUM STAGE,FT | TIME HOURS |
|-------|---------------------|---------------------|---------------|
| 0.20 | 3803. | 1725.3 | 44.75 |
| 0.50 | 11939. | 1728.5 | 43.50 |
| 0.60 | 14334. | 1729.0 | 43.50 |
| 0.80 | 19118. | 1730.0 | 43.50 |
| 1.00 | 23893. | 1730.9 | 43.50 |

PLAN 1 STATION 2

| RATIO | MAXIMUM FLOW,CFS | MAXIMUM STAGE,FT | TIME HOURS |
|-------|---------------------|---------------------|---------------|
| 0.20 | 3808. | 1711.6 | 45.00 |
| 0.40 | 9526. | 1714.5 | 43.50 |
| 0.50 | 11937. | 1715.4 | 43.50 |
| 0.60 | 14335. | 1716.2 | 43.50 |
| 0.80 | 19125. | 1717.6 | 43.50 |
| 1.00 | 23901. | 1718.8 | 43.50 |

PLAN 1 STATION 3

| RATIO | MAXIMUM FLOW,CFS | MAXIMUM STAGE,FT | TIME HOURS |
|-------|---------------------|---------------------|---------------|
| 0.20 | 3791. | 1689.5 | 45.00 |
| 0.40 | 9503. | 1691.8 | 43.75 |
| 0.50 | 11909. | 1692.5 | 43.50 |
| 0.60 | 14319. | 1693.1 | 43.50 |
| 0.80 | 19111. | 1694.0 | 43.50 |
| 1.00 | 23895. | 1694.8 | 43.50 |

DAM 565 ISCHUA CREEK DAM #5

REF. QUAD. FRANKINVILLE N.Y.
 RAWSON N.Y.

DRAINAGE DISTANCE

DISTANCE L & LCA MEAS. WITH A MAP MEASURING WHEEL (1" = 2000')

COMPUTATIONS FOR L DISTANCE

| RUN | MEAS. DIST. | AVG. DIST. | COEF. | L- DISTANCE |
|-----|-------------|------------------|----------------|---------------|
| A | 1 = 8.8" | | | |
| | 2 = 8.7" | | | |
| | 17.5 | $\div 2 = 8.75'$ | $\times 2000'$ | = 17500 FT. * |
| B | 1 = 8.45" | | | |
| | 2 = 8.75" | | | |
| | 17.40 | $\div 2 = 8.7'$ | $\times 2000'$ | = 17400 FT. |
| C | 1 = 7.95" | | | |
| | 2 = 7.90" | | | |
| | 15.85 | $\div 2 = 7.93'$ | $\times 2000'$ | = 15860 FT |
| D | 1 = 7.9" | | | |
| | 2 = 7.8" | | | |
| | 15.7 | $\div 2 = 7.85'$ | $\times 2000'$ | = 15700 FT. |
| E | 1 = 7.2" | | | |
| | 2 = 7.3" | | | |
| | 14.5 | $\div 2 = 7.25'$ | $\times 2000'$ | = 14500 FT. |

* L = 17500 FT (USED RUN A)

COMPUTATIONS FOR LCA DISTANCE

| | |
|-----|---|
| RUN | |
| A | 1 = 4.65" |
| | 2 = 4.65" |
| | 9.30 $\div 2 = 4.65'$ $\times 2000'$ = 9300 FT. |

Lca = 9300 FT

BY P.L.P. DATE 4/20/81 ERDMAN, ANTHONY, ASSOCIATES SHEET 2 OF 18
 C B.R. DATE 4/23/81 SUBJECT DAM 565 HYDROLOGY SUB-SHEET NO. 2
 OWNER _____ PROJECT NAME HEC-1 DB DAM INSPECTION 80166-00.06

DAM 565 ISCHUA CREEK DAM #5

REF. QUADS

RAWSON, NY

FRANKLINVILLE, NY

[GATES CREEK]
WATERSHED

DISTANCE FOR L & LCA MEASURED WITH MAP MEASURING WHEEL (1" = 2000')

COMPUTATION FOR L DISTANCE

| RUN | MEAS. DIST. | AVG. DIST. | COEF. | L DISTANCE |
|-----|-------------------------------|------------------------|----------------|-----------------------|
| A | 1 = 10.3 2 = <u>10.2</u> | | | |
| | | $20.5 \div 2 = 10.25$ | $\times 2000'$ | = 20,500 FT. |
| B | 1 = 10.85 2 = <u>10.35</u> | | | |
| | | $21.70 \div 2 = 10.85$ | $\times 2000'$ | = 21,700 FT. |
| C | 1 = 11.20 2 = <u>11.25</u> | | | |
| | | $22.45 \div 2 = 11.23$ | $\times 2000'$ | = * <u>22,460 FT.</u> |

* L = 22,460 FT (USED RUN C)

COMPUTATION FOR LCA DISTANCE

| RUN | MEAS. DIST. | AVG DIST. | COEF. | LCA DISTANCE |
|-----|---------------------------|---------------------|----------------|----------------------|
| C | 1 = 6.5 2 = <u>6.5</u> | | | |
| | | $13.0 \div 2 = 6.5$ | $\times 2000'$ | = * <u>13,000 FT</u> |

* LCA = 13,000 FT.

$$T_p = C_t (L L_{ca})^{0.3}$$

$$C_t = 2.00 \checkmark$$

$$T_r = \frac{T_p}{5.5}$$

$$C_p = 0.63 \checkmark$$

$$T_{PR} = T_p + 0.25(T_R - T_r)$$

$$L = 17500 \text{ ft} = 3.31 \text{ mi} \checkmark$$

$$L_{ca} = 9300 \text{ ft} = 1.76 \text{ mi} \checkmark$$

$$T_p = 2(3.31 \times 1.76)^{0.3} = 3.39 \text{ hr.}$$

$$T_r = \frac{3.39}{5.5} = 0.62 \text{ hr.} \implies T_R = 1.00 \text{ hr.}$$

$$T_{PR} = 3.39 + 0.25(1.00 - 0.62) = 3.49 \text{ hr}$$

BY R.R. DATE 4/24/81 ERDMAN, ANTHONY, ASSOCIATES SHEET 4 OF 18
 D WHA DATE 4/27/81 SUBJECT DAM 565, HYDROLOGY SUB-SHEET NO. 4
 OWNER _____ PROJECT NAME DAM INSPECTION 80166-00.06

GATES CREEK WATERSHED

gate creek watershed area = 46.3 in² on scale 1/24000

$$= 46.3 \times 24000^2 \text{ in}^2$$

$$= \frac{46.3 \times 24000^2 \text{ in}^2}{12^2 \frac{\text{in}^2}{\text{ft}^2} \times 27878400 \frac{\text{ft}^2}{\text{MILE}^2}} = 6.64 \text{ MILE}^2 \checkmark$$

TRSDA for M card :

$$\text{TRSDA} = 6.64 + 6.4 = 13.04 \text{ MILE}^2 \checkmark$$

PMS for P card

$$T_p = C_T (L L_{ca})^{0.3}$$

$$T_r = \frac{T_p}{5.5}$$

$$C_T = 2.0$$

$$C_p = 0.63$$

$$T_{PR} = T_p + 0.25 (T_R - T_r)$$

$$L = 22,460 \text{ ft} = \frac{22460}{5280} = 4.25 \text{ mile} \checkmark$$

$$L_{ca} = 13,000 \text{ ft} = \frac{13000}{5280} = 2.46 \text{ mile} \checkmark$$

$$T_p = 2 (4.25 \times 2.46)^{0.3} = 4.04 \text{ hr.} \checkmark$$

$$T_r = \frac{4.04}{5.5} = 0.73 \text{ hr.} \checkmark \implies T_R = 1.00 \text{ hr.} \checkmark$$

$$T_{PR} = 4.04 + 0.25 (1 - 0.73) = 4.11 \text{ hr.} \checkmark$$

DAM 565 HYDRAULICS

SERVICE SPILLWAY

A' or 48" ϕ RCP \checkmark w/ 12' x 4' RISER \checkmark

FROM DESIGN REPORT : $Q_s = 305 \text{ cfs}$ @ ELEV. 1780.6

$Q_s = 0 \text{ cfs}$ @ ELEV. 1772
 (Ignore 24"x18" orifice in riser)

$$Q_s = C_o A_o \sqrt{2g H_o}$$

$$A_o = 4\pi \text{ ft}^2 \checkmark$$

note: the cross sectional
 area of RCP is
 assumed to control.

$$H = 1780.6 - 1772 = 8.6' \checkmark$$

$$C_o = \frac{Q_s}{A_o \sqrt{2g H_o}} = \frac{305}{4\pi \sqrt{2 \times 32.2 \times 8.6}} = 1.03 \checkmark$$

| SERVICE SPILLWAY | | |
|------------------|-------|------------------|
| ELEV. | H_o | Q_s |
| 1772 | 0 | |
| 1775 | | |
| 1778 | | |
| 1780.6 | 8.6 | 305 \checkmark |
| 1781 | 9.0 | 312 \checkmark |
| 1782 | 10 | 328 \checkmark |
| 1783 | 11 | 345 \checkmark |
| 1784 | 12 | 360 \checkmark |
| 1785 | 13 | 375 \checkmark |
| 1786 | 14 | 389 \checkmark |
| 1787 | 15 | 402 \checkmark |
| 1788 | 16 | 415 \checkmark |
| 1789 | 17 | 428 \checkmark |
| 1790.2 | 17.2 | 431 \checkmark |

For elevation higher than the
 crest of riser.

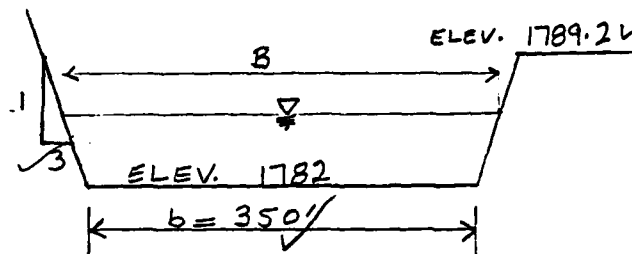
$$Q_s = 1.03 \times 4\pi \sqrt{2g} H_o^{\frac{1}{2}}$$

$$Q_s = 103.87 H_o^{\frac{1}{2}} \checkmark$$

| ELEV. | H_o | Q_s |
|-------|-------|------------------|
| 1790 | 18 | 441 \checkmark |
| 1791 | 19 | 453 \checkmark |
| 1792 | 20 | 465 \checkmark |

EMERGENCY SPILLWAY

$$Q_c = \sqrt{\frac{g A^3}{B}}$$



EMERGENCY SPILLWAY SECTION

For $y = 1'$

$$s = 0.05 \checkmark$$

$$B = (2 \times 3) + 350 = 356 \checkmark$$

$$A = \frac{1}{2} (356 + 350) (1) = 353 \checkmark \quad \text{ft}^2$$

$$Q_c = \sqrt{\frac{32.2 (353)^3}{356}} = 1995 \text{ cfs} \checkmark$$

$$K = \frac{1.49}{n} AR^{2/3} = \frac{1.49}{0.035} (353) \left[\frac{353}{350 + 2(1+9)^{0.5}} \right]^{2/3}$$

$$K = 14934.1$$

$$S_c = \left(\frac{Q_c}{K} \right)^2 = \left(\frac{1995}{14934.1} \right)^2 = 0.018 \checkmark$$

spillway slope $>$ critical slope

$$0.05 > 0.018$$

\therefore Flow goes through critical depth for $y = 1'$ and also for $y > 1'$. Use Table 8-7 from "King & Brater"

ISCHUA CREEK DAM # 5

\$A RAREA RESERVOIR SURFACE AREA IN ACRES

\$E BELEV RESERVOIR ELEVATIONS IN FEET

REF. U.S. DEPT. OF A.S.C.A. AS BUILT PLAN DWG. NY-805-P

SCALE 1" = 200' x 1/2 REDUCTION = 1" = 400'

$$Eq. \text{ in}^2 \times \frac{400^2 \text{ ft}^2}{\text{in}^2} \times \frac{1 \text{ AC}}{43560 \text{ ft}^2} = \text{AC.} \quad \checkmark$$

ELEV 1752. = 8.5 AC. GIVEN.

$$1760 = 5.35 \text{ in}^2 \times \frac{400^2 \text{ ft}^2}{\text{in}^2} \times \frac{1 \text{ AC}}{43560 \text{ ft}^2} = \underline{19.65 \text{ AC}} \quad \checkmark$$

$$1770 = 10.28 \text{ in}^2 \times \frac{400^2 \text{ ft}^2}{\text{in}^2} \times \frac{1 \text{ AC}}{43560 \text{ ft}^2} = \underline{37.76 \text{ AC.}} \quad \checkmark$$

1772 = 42.0 AC GIVEN.

1780.6 = 70.0 AC GIVEN

$$1785 = 2337 \text{ in}^2 \times \frac{400^2 \text{ ft}^2}{\text{in}^2} \times \frac{1 \text{ AC}}{43560 \text{ ft}^2} = \underline{85.84 \text{ AC.}} \quad \checkmark$$

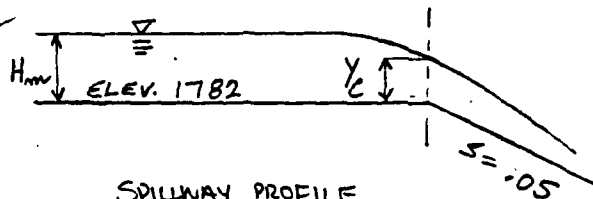
$$1790 = 27.46 \text{ in}^2 \times \frac{400^2 \text{ ft}^2}{\text{in}^2} \times \frac{1 \text{ AC}}{43560 \text{ ft}^2} = \underline{100.36 \text{ AC.}} \quad \checkmark$$

Used storage-elevation relationship from SC design report for the computer model.

$$Z = 3/1 = 3.0$$

$$b = 350'$$

$$Q_E = C_2 b H_m^{1.5}$$



| EMERGENCY SPILLWAY, Q - ELEV. RELATIONSHIP | | | | |
|--|-------------------|-------|-------|--------|
| H_m | $\frac{H_m Z}{b}$ | C_2 | Q_E | ELEV. |
| 0.0 | 0 | 3.09 | 0 | 1782 |
| 1 | 0.01 | 3.11 | 1089 | 1783 |
| 2 | 0.02 | 3.13 | 3099 | 1784 |
| 3 | 0.03 | 3.15 | 5729 | 1785 |
| 4 | 0.03 | 3.15 | 8820 | 1786 |
| 5 | 0.04 | 3.17 | 12405 | 1787 |
| 6 | 0.05 | 3.19 | 16409 | 1788 |
| 7 | 0.06 | 3.21 | 20808 | 1789 |
| 7.2 | 0.06 | 3.21 | 21706 | 1789.2 |

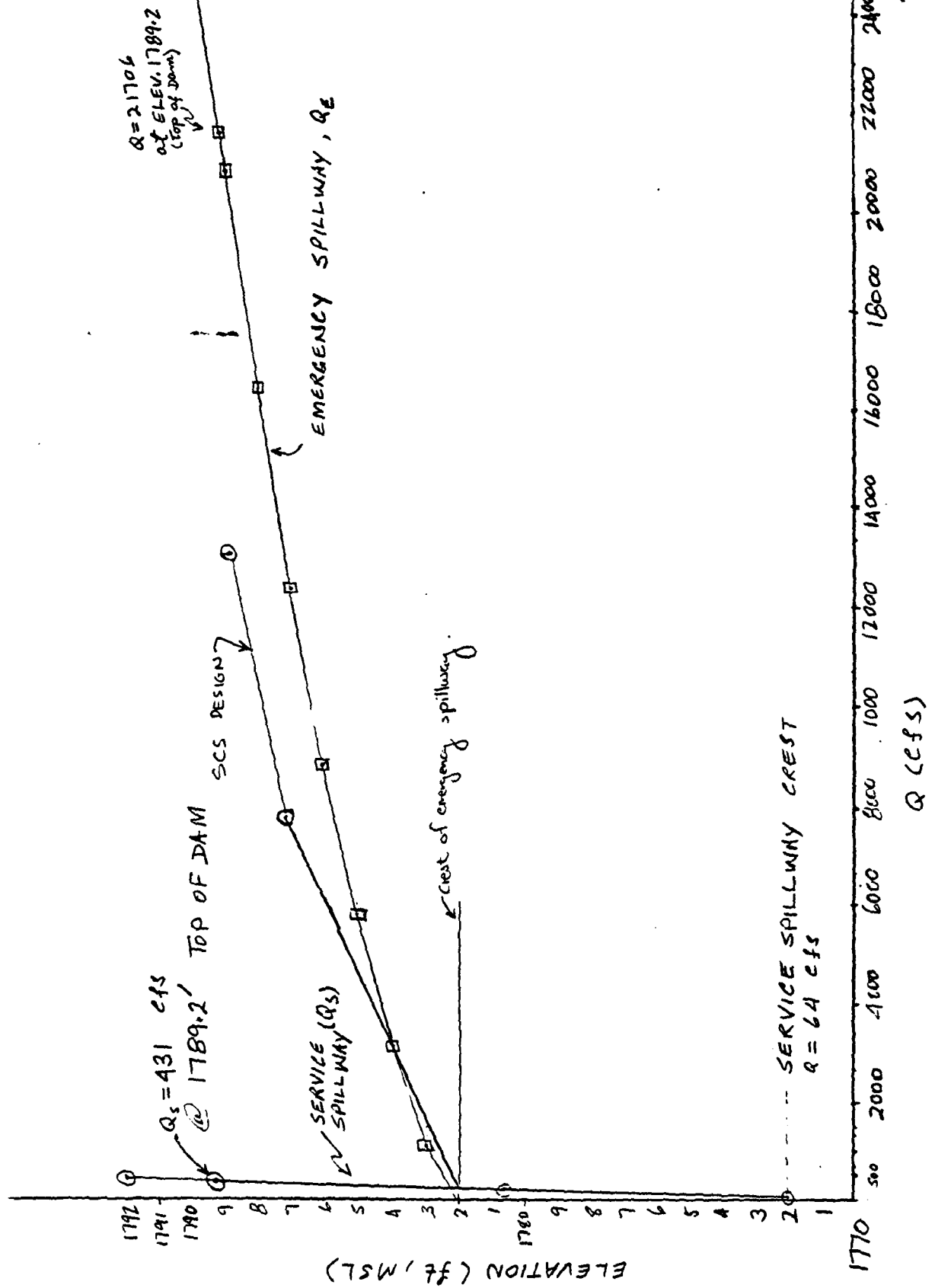
| H_m | $\frac{H_m Z}{b}$ | C_2 | Q_E | ELEV. |
|-------|-------------------|-------|-------|-------|
| 8 | 0.07 | 3.23 | 25580 | 1790 |
| 9 | 0.08 | 3.25 | 30713 | 1791 |
| 10 | 0.09 | 3.27 | 36192 | 1792 |

| TOTAL SPILLWAYS DISCHARGE | | |
|---------------------------|-------------|------------------------|
| ELEV. | $Q_S + Q_E$ | RESERVOIR SURFACE AREA |
| 1772 | 664 | 42.0 |
| 1775 | 6145 | |
| 1778 | 6270 | |
| 1780.6 | 305 | 70.0 |
| 1781 | 312 | |
| 1782 | 328 | |
| 1783 | 1434 | |
| 1784 | 3459 | |
| 1785 | 6104 | 85.84 |
| 1786 | 9209 | |
| 1787 | 12807 | |
| 1788 | 16824 | |
| 1789 | 21236 | |
| 1789.2 | 22137 | |
| 1790 | 26021 | 100.86 |

① SCS DESIGN FLOW IS ADAPTED
 * EMERGENCY SPILLWAY CREST
 ** TOP OF DAM

| ELEV. | $Q_S + Q_E$ | RESERVOIR SURFACE AREA |
|-------|-------------|------------------------|
| 1791 | 31166 | |
| 1792 | 36657 | |

SPILLWAY RATING CURVE - DAM 565



BY B.R. DATE 3/30/81 ERDMAN, ANTHONY, ASSOCIATES SHEET 11 OF 19
 KD QDA DATE 4/1/81 SUBJECT DAM SGS-HYDRAULICS SUB-SHEET NO. 6
 OWNER _____ PROJECT NAME DAM INSPECTIONS 80166-00.06

VALUES ON \$D CARD OF HEC-1 PROGRAM

| <u>FIELD</u> | <u>VARIABLE</u> | <u>VALUE</u> |
|--------------|-----------------|--------------|
| 0 | ID | \$D |
| 1 | TOPEL | 1789.2 ✓ |
| 2 | CPRD | 2.7 ✓ |
| 3 | EXPD | 1.5 ✓ |
| 4 | DAMWID | 1300 ✓ |

Ungated Spillway Capacity @ Test Flood Elev. 1786.9
 Elev / Q

| | | |
|-----------|--------|--------|
| Principal | 1786.0 | 389 ✓ |
| | 1787.0 | 402 ✓ |
| Emergency | 1786.0 | 8820 |
| | 1787.0 | 12,405 |

Emergency

$$(.4)(12,405 - 8820) + 8820 = 12,047 \text{ cfs}$$

Principal

$$(.9)(402 - 389) + 389 = 401 \text{ cfs} \checkmark$$

$$Q_{\text{Total}} @ 1786.9 = 12,515 \text{ cfs} \quad (\text{from computer output})$$

$$- Q_{\text{service}} @ 1786.9 \quad \underline{401 \text{ cfs}}$$

$$Q_{\text{es}} @ 1786.9 \quad 12,114 \text{ cfs} \checkmark$$

| ELEV. | Reservoir Surface Area |
|-------|---------------------------|
| 1785 | 85.84 ✓ |
| 1780 | 100.86 ✓ |

Reservoir SA @ 1786.9

$$\frac{5'}{15.02'} = \frac{1.9}{x} \quad x = 5.71' \checkmark$$

$$SA = 85.84 + 5.71 = 91.55' \checkmark$$

Reservoir SA @ 1789.2

$$\frac{5'}{15.02'} = \frac{4.2}{x} \quad x = 12.62' \checkmark$$

$$SA = 85.84 + 12.62 = 98.46' \checkmark$$

Emergency Spillway Velocities

| <u>Flood</u> | <u>Q_{TOTAL}</u> | <u>ELEV</u> | <u>Q_{ES}</u> | <u>A</u> | <u>V</u> | <u>Comments</u> |
|--------------|--------------------------|-------------|-----------------------|----------|----------|------------------------|
| PMF | 12515 | 1786.92 ✓ | 12,114 ✓ | 1077 ✓ | 11.2 ✓ | > 8 ft/sec ∴ erosion |
| 1/2 PMF | 6228 ✓ | 1775.04 ✓ | 5853 | 690 | 8.5 | > 8 ft/sec ✓ ∴ erosion |

PMF

Assume $y_n/b < 0.02 \Rightarrow \therefore y_n = 0.789 \left(\frac{Q_n}{b \sqrt{g}} \right)^{0.6}$

$$y_n = 0.789 \left(\frac{12,114 (0.06)}{350 (0.05)^{1/2}} \right)^{0.6} = 3.00' \quad y_n/b = \frac{3.00}{350} = 0.008 < 0.02 \quad \text{OK}$$

$$A = (3.0)(350') + \frac{1}{2} \left(\frac{1}{4} (3.0)(9.0) \right) = 1077 \text{ ft}^2 \checkmark$$

$$V = \frac{Q}{A} = \frac{12,114}{1077} = 11.2 \text{ ft/sec.}$$

1/2 PMF

$$6228 \text{ cfs} - 375 \text{ cfs} = 5853 \text{ cfs} \checkmark$$

Assume $y_n/b < 0.02 \Rightarrow \therefore y_n = 0.789 \left(\frac{Q_n}{b \sqrt{g}} \right)^{0.6}$

$$y_n = 0.789 \left(\frac{5853 (0.06)}{350 (0.05)^{1/2}} \right)^{0.6} = 1.94' \quad y_n/b = \frac{1.94}{350} = 0.005 < 0.02 \quad \text{OK}$$

$$A = (1.94')(350') + \frac{1}{2} \left(\frac{1}{4} (1.94)(30)(1.94') \right) = 690 \text{ ft}^2 \checkmark$$

$$V = \frac{Q}{A} = \frac{5853}{690} = 8.5 \text{ ft/sec.} \checkmark$$

Stage vs. Storage Relationship

Instead of a surface area vs. elevation relationship developed on sub-sheet 3, the storage vs. elevation relationship provided by SCS in the design report will be used.

Elevation

1739
 1752
 1772
 1780.6
 1787.2
 1788.9
 1790

Storage

0 ✓
 45 ✓
 470 ✓
 926 ✓
 1410 ✓
 1616 ✓
 1716 - extrapolated value

B.R. 4/13/81
 TRA 4/13/81 ISCHUA CREEK DAM 5

DAM DATA FROM AS-BUILT PLAN

DAM TOP ELEV. = 1790.1
 DAM INV. ELEV. = 1736.

| | | | | | | | |
|------|------|------|-------|-------|------|------|------|
| 1780 | 1760 | 1725 | 1719 | 1719 | 1725 | 1760 | 1780 |
| 0 | 150 | 660 | 667.5 | 682.5 | 690 | 1790 | 2000 |

REACH 1 LENGTH = 2100'

CROSS SECT.

| | | | | | | | |
|------|------|------|------|------|------|------|------|
| 1780 | 1760 | 1740 | 1719 | 1719 | 1740 | 1760 | 1780 |
| 0 | 150 | 400 | 670 | 680 | 1500 | 1740 | 2000 |

SLOPE: DAM INV. - REACH 1 INV. = $h \div L = \text{SLOPE}$
 1736 - 1719 = $17 \div 2100 = 0.0081$

Y6 - 6col

Y7 1-10

REACH 2 LENGTH = 2100'

| | | | | | | | |
|------|------|------|-------|-------|------|------|------|
| 1730 | 1720 | 1710 | 1705 | 1705 | 1710 | 1720 | 1730 |
| 0 | 675 | 800 | 842.5 | 857.5 | 900 | 960 | 1100 |

CROSS SECT.

| | | | | | |
|------|------|------|------|------|------|
| 1730 | 1720 | 1705 | 1705 | 1720 | 1730 |
| 0 | 675 | 805 | 895 | 960 | 1100 |

SLOPE: REACH 1 INV. - REACH 2 INV. = $h \div L = \text{SLOPE}$
 1719 - 1705 = $14 \div 2100 = 0.0066$

REACH 3 LENGTH = 3600'

| | | | | | | | |
|------|------|------|-------|-------|------|------|------|
| 1720 | 1700 | 1688 | 1683 | 1683 | 1688 | 1700 | 1720 |
| 0 | 100 | 655 | 697.5 | 712.5 | 755 | 1050 | 1500 |

CROSS SECT.

| | | | | | |
|------|------|------|------|------|------|
| 1720 | 1700 | 1683 | 1683 | 1700 | 1720 |
| 0 | 100 | 700 | 710 | 1050 | 1500 |

SLOPE: REACH 2 INV. - REACH 3 INV. = $h \div L = \text{SLOPE}$
 1705 - 1683 = $22 \div 3600 = 0.0061$

REACH 4 LENGTH = 6700'

CROSS SECT.

| | | | | | |
|------|------|------|------|------|------|
| 1700 | 1660 | 1639 | 1639 | 1660 | 1700 |
| 0 | 500 | 1250 | 1260 | 1600 | 1700 |

SLOPE: REACH 3 INV. - REACH 4 INV. = $h \div L = \text{SLOPE}$
 1683 - 1639 = $44 \div 6700 = 0.0066$

NOT BEING
 USED
 (REACHES
 4, 5, 6, 7, 8)

REACH 5 LENGTH = 5400'

CROSS SECT.

| | | | | | | | |
|------|------|------|------|------|------|------|------|
| 1640 | 1620 | 1600 | 1598 | 1598 | 1600 | 1620 | 1640 |
| 0 | 75 | 100 | 120 | 130 | 225 | 1300 | 1350 |

SLOPE: REACH 4 INV. - REACH 5 INV. = $h \div L = \text{SLOPE}$
 1639 - 1598 = $41 \div 5400 = 0.0076$

CONTINUED ON SHEET 2

Y. P.R.P. DATE 3/23/81 ERDMAN, ANTHONY, ASSOCIATES SHEET 17 OF 18
 CKD B.R. DATE 3/24/81 SUBJECT DAM 565 ROUTING SUB-SHEET NO. 2
 OWNER PROJECT NAME DAM INSPECTION 80166-00.06

ISCHUA CREEK DAM 5

REACH 6 LENGTH = 2000'

CROSS SECT. 1585 1580 1579 1579 1580 1585
 0 15 50 60 110 1050

SLOPE: REACH 5 INV. - REACH 6 INV. = $h \div L = \text{SLOPE}$
 1598 - 1579 = $19' \div 2000' = 0.0095$ ✓

REACH 7 LENGTH = 1600'

CROSS SECT. 1535 1580 1570 1570 1580 1585
 0 75 150 160 200 400

SLOPE: REACH 6 INV. - REACH 7 INV. = $h \div L = \text{SLOPE}$
 1579 - 1570 = $9' \div 1600' = 0.0056$ ✓

REACH 8 LENGTH = 3800'

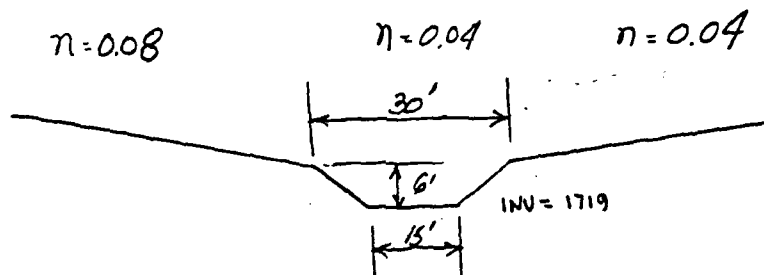
CROSS SECT. 1580 1560 1560 1563 1559 1559 1560 1580
 0 75 100 150 205 250 275 1475

SLOPE: REACH 7 INV. - REACH 8 INV. = $h \div L = \text{SLOPE}$
 1570 - 1559 = $11' \div 3800' = 0.0029$ ✓

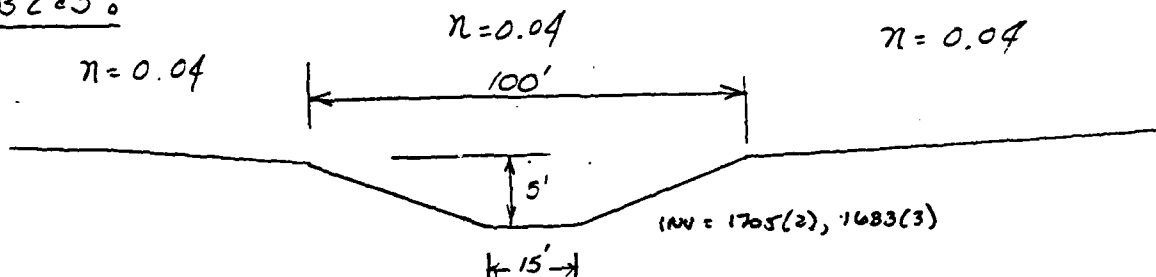
WRA DATE 4/13/91 ERDMAN, ANTHONY, ASSOCIATES SHEET 18 OF 18
KD B.R. DATE 4/13/91 SUBJECT DAM 565 - CHANNEL SECTIONS SUB-SHEET NO. 1
OWNER PROJECT NAME DAM INSPECTIONS (20166-00.06)

DAM 565 - CHANNEL SECTIONS

SECTION 1:



SECTIONS 2 & 3:



APPENDIX E

INFORMATION AS CONTAINED IN
THE NATIONAL INVENTORY OF DAMS

AD-A105 800

ERDMAN ANTHONY ASSOCIATES ROCHESTER NY
NATIONAL DAM SAFETY PROGRAM, ISCHUA CREEK WATERSHED DAM NUMBER --ETC(U)
AUG 81 R J FARRELL

F/6 13/13

DACW51-81-C-0017

NL

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END
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